



TITLE- Chronic kidney disease and its treatment

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ABSTRACT

Chronic kidney disease (CKD) is a global public health problem and a significant contributor to the non-communicable disease burden. CKD contributes to global morbidity and is also a risk factor for cardiovascular disease. Currently, there is no consensus on the optimal management of patients with chronic kidney disease. This review aims to provide a comprehensive review of the most common causes of chronic kidney diseases, their associated risk factors, diagnosis and treatment.

KEYWORDS- Chronic kidney disease, urine formation, kidney biopsy, dialysis, hypertension, diabetes, kidney transplant

1.INTRODUCTION

KIDNEYS

The paired kidneys are bean shaped organs that weigh between 120 and 135g for females and 150 to 200g for males. Each kidney in an adult human measure roughly 10-12 cm in length, and 3-5 cm in thickness. On each side of the spinal column, between the 12 thoracic and 3 lumber vertebrae, are the paired kidneys.

On the posterior abdominal wall, retroperitoneally, they are situated. The nephron is the kidney's functional unit. There are about 2 million nephrons in an adult kidney. [1]

ANATOMY OF KIDNEY

The kidney is surrounded by three primary layers: renal fascia, adipose capsules, and renal capsules. The kidney's internal structure consists of the cortex, renal medulla, and renal pelvis. The cortex, with its large number of renal corpuscles, resembles granules and contains a high density of blood vessels. The renal medulla contains triangular renal pyramids, including the loop of Henle and collecting ducts of the nephrons and blood vessels of vasa recta. Nephrons generate urine through renal papillae, which drains into minor and major calyces. Urine formation occurs in three main stages: glomerular filtration, tubular reabsorption, and secretion. During glomerular filtration, blood components are filtered out of the renal filtrate, while tubular reabsorption recovers 99% of water and electrolytes. Secretion eliminates waste materials like urea, uric acid, and metabolites. [2]

FUNCTION OF KIDNEY

- 1.They clean waste and toxic products out of the body.
2. Acid-base balance is regulated by kidney.
3. The kidney's tiny blood vessels filter the blood.
4. Renin, a protein produced by the kidney, raises blood pressure.
5. The hormone calcitriol, a type of vitamin D that aids in the body's absorption of calcium, is produced by the kidney.
6. Erythropoietin is regulated by kidney.
7. Kidney controls the balance of water and electrolyte.
8. Adrenal gland of kidney generates cortisol hormone. [3][4]

CHRONIC KIDNEY DISEASE

Chronic kidney disease (CKD) is a condition characterized by kidney damage or a reduced glomerular filtration rate (GFR) for at least three months. The nephrons develop irreversible sclerosis when nephron loss occur, functional renal mass reduction reaches a certain point. CKD stages are classified into Stages 1 (normal or elevated GFR), Stage 2 (moderately reduced GFR), Stage 3a (moderate decline in GFR), Stage 3b (moderate decline in GFR), Stage 4 (severe decline in GFR), and Stage 5 (kidney failure). The prevalence of CKD is higher in the elderly, with patients over 70 making up nearly half of the total. Regular

laboratory testing can detect CKD, and specific treatment can reduce the risk of cardiovascular disease, improve quality of life, and increase survival. [5][6][7]

EPIDEMIOLOGY

Chronic kidney disease (CKD) is a global public health issue, with prevalence ranging from 8-16%, with 387.5 million cases from low-middle-income countries accounting for 78% of the total. CKD significantly contributes to global morbidity and cardiovascular disease risk. Low awareness among LMIs has led to a high percentage of individuals seeking care later in life, placing more burden on the health system. Over 2.5 million people are currently undergoing renal replacement therapy, with the number expected to double by 2030. However, many nations lack or lack renal replacement services, contributing to early deaths. Over 10% of the adult population in the US, Australia, and Norway have kidney disease markers. Common causes of CKD vary, with diabetes causing 30-50% of CKD. By 2030, this number is predicted to rise by 69% in high-income nations and 20% in low-income and middle-income nations. Antiretroviral therapies can cause nephrotoxic effects, while hepatitis B and C infections affect 2-4% of the global population. [8][9][10][11][12]

2. ETIOLOGY, RISK FACTORS AND SYMPTOMS

ETIOLOGY

Chronic kidney function (CKD) can be caused by various factors, including diabetes, hypertension, glomerular disease, cystic kidney disease, urinary tract obstruction or dysfunction, recurrent kidney stone disease, birth defects, unrecovered acute kidney injury, vascular disease, and tubulointerstitial disease. Diabetes causes damage to blood vessels and other kidney cells, leading to kidney damage and potentially leading to kidney failure. Risk factors for diabetic nephropathy include uncontrolled high blood sugar, hypertension, smoking, high cholesterol, obesity, and hypertension. Glomerular disease affects the glomeruli, small blood vessels that serve as the kidney's cleaning units. [13] [14] [15] [16]

RISK FACTORS

Following are some risk factors for CKD:

Obesity

Socioeconomic status

Smoking

Nephrotoxins

Diabetes Mellitus

Hypertension [17]

SYMPTOMS

Some of the symptoms of CKD are as following:

Pain

Itching

Nausea

Fatigue

Cognitive impairment

Sleep disorders

Depression

Anxiety

Haematuria

Proteinuria

Oedema [18] [19] [20]

3. DIAGNOSIS AND TREATMENT

DIAGNOSIS

Tests are crucial for diagnosing kidney disease, especially in patients with diabetes, high blood pressure, or a family history of kidney disease. These tests include eGFR, urine test, serum creatinine test, blood urea nitrogen (BUN) test, kidney ultrasound, and kidney biopsy, eGFR measures kidney function, while urine test detects signs of kidney damage, such as protein leakage into urine. Serum creatinine test gauges kidney function, while BUN test quantifies urea and nitrogen content. Kidney ultrasound shows abnormal kidney size and shape, blood flow, signs of kidney damage, kidney stones, and cysts. Kidney biopsy, a procedure where a small piece of kidney is taken under a microscope, helps determine the severity of the kidney problem and the best treatment. These tests are especially important for patients with diabetes, high blood pressure, or a family history of kidney disease. [21]

TREATMENT

Chronic kidney disease (CKD) is a chronic condition that cannot be cured, but treatment can help alleviate symptoms and prevent worsening. Treatments depend on the stage of CKD and include lifestyle changes, medication to control associated problems like high blood pressure and high cholesterol, dialysis to replicate some kidney function, and kidney transplants.

Lifestyle changes for people with kidney disease include quitting smoking, maintaining a healthy diet, limiting salt intake, engaging in regular exercise, avoiding alcohol, losing weight, and avoiding over-the-counter NSAIDs. High blood pressure is generally controlled with medications like angiotensin converting enzyme (ACE) inhibitors, while diabetes patients should take SGLT-2 inhibitors. Statins are prescribed to reduce the risk of developing cardiovascular disease. Sodium zirconium cyclosilicate is used to treat hyperkalemia, and diuretics may be prescribed to reduce swelling.

Dialysis is a process used when kidneys stop functioning properly to remove waste materials and extra fluid from the blood. There are two main types of dialysis: haemodialysis and peritoneal dialysis.

Kidney transplants are the most effective treatment for advanced kidney disease, which involves major surgery and taking immunosuppressive drugs for the rest of life. Short-term risks include blood clots and infection, while long-term issues like diabetes and increased risk of infections are typically linked to medications taken to lower the body's propensity to reject kidney tissue. [22] [23]

CONCLUSION

The conclusion of this review article is that the kidneys are vital organs responsible for various functions such as filtering toxins and waste from the body, regulating water and electrolyte balance, controlling acid-base balance, producing hormones, and maintaining homeostasis. Chronic kidney disease (CKD) is a condition characterized by kidney damage or decreased glomerular filtration rate (GFR) is caused by various factors such as diabetes, hypertension, glomerular disease, cystic kidney disease, urinary tract obstruction, and kidney stones. CKD is a significant global public health issue and is associated with increased morbidity and mortality.

The main symptoms of chronic kidney disease (CKD) include pain, itching, nausea, vomiting, fatigue, cognitive impairment, sleep disorders, depression and anxiety, haematuria, proteinuria and oedema. Diagnosis of CKD involves blood and urine tests, kidney ultrasound, and kidney biopsy. Treatment options for CKD include lifestyle changes, medication, dialysis and kidney transplant.

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