

## Renal Failure, Types, Causes and Etiology: A Review Article

Israa Harjan Mohsen<sup>1</sup>, Raof Jabbar Maaroo<sup>2</sup>, Athraa HarjanMohsen<sup>3</sup>

<sup>1,2</sup>College of Nursing, University of Babylon\ Iraq.

<sup>3</sup>College of Sciences, University of Kufa\ Iraq.

### ABSTRACT

Renal failure is the most important disease that causes losing in the efficiency of kidney and is renal failure or may called end stage kidney disease where capacity for kidney become 15% less than the normal levels .This disease can be classified into two types : first (acute kidney failure ) which may resolve and it rapidly developed .Second (chronic kidney failure) : it slowly developed and may become a permanent condition Symptoms of Renal failure include vomiting; swelling in the legs; a loss of appetite; confusion and tiredness. Several complications occurred which include high blood potassium ; volume overload and uremia in acute condition while high blood pressure; anemia and heart disease in the chronic condition. There are several factors that may lead to the progress of acute renal failure conditions such as hypotension, a blockage of the urinary tract, hemolytic uremic syndrome and some medications. While diabetes, hypertension, polycystic renal disease and nephrotic syndrome represent the major causes of chronic renal failure . Signs that help in identification of acute and chronic renal failure based on mishmash of several factors and help in distinguish between its types such as increasing of creatinine levels and decreasing of urine production are the signs of acute failure while decrease the rate of glomerular filtration to below of 15 or therapy with renal replacement are the signs of chronic renal failure. Acute failure can be treated depending on the main causes, on the other hand may use dialysis (hemodialysis or peritoneal dialysis) or kidney transplant in order treating chronic failure.

**KEYWORDS:** renal failure, acute renal failure, chronic renal failure

### ARTICLE DETAILS

**Published On:**  
**18 August 2023**

**Available on:**  
<https://ijmscr.org/>

### INTRODUCTION

Kidney is a vital organ in the human body which removes waste products from circulation such as nitrogenous waste and exogenous molecules, such as drugs ,in addition to regulation levels of electrolytes, participated in the synthesis of erythropoietin hormone and Metabolism of proteins that are low molecular weight, such as insulin. <sup>(1)</sup>

The incapability of the kidney to achieve its excretion function leads to the preservation of nitrogenous waste products from the circulation and this is represented as renal failure. <sup>(2)</sup>

Two types of renal failure : Acute and chronic renal failure.<sup>(3)</sup>

#### 1.Acute Renal Failure (ARF):

This type is reversible and it is intimate when occur suddenly in the blood supply or in case of toxins overload the kidneys and this will lead to loss of kidney function unexpectedly<sup>(4)</sup>.

It can be diagnosed when Creatinine level in 48 hours elevated to 0.3 mg/dL or to 1.5 times limit in last 7 days along with reduction the volume of urine to below 0.5 mL/kg per hour for 6 hours <sup>(5)</sup>. Another term acute kidney injury (AKI) is

used instead of Acute Renal Failure because it is more comprehensive.<sup>(6)</sup> Several risk factors are responsible related to progress of acute renal failure such as anemia, hypertension ,infectious disease (such as malaria) ,chemotherapy and sepsis .This condition represented as lethal condition and it is more prevalent in older aged while according to gender it is more prevalent in men than in women.<sup>(7)</sup>

#### 2. Chronic Renal Failure (CRF):

This kind corresponds to the advancing defeat of kidney functions where the creatinine levels increased for function of a minimum of 3 months or the analyzed glomerular filtration rate (GFR) is below 60 ml per minute / 1.73m<sup>2</sup> <sup>(8)</sup>and this will lead to using dialysis or transplantation and this condition called end-stage renal disease (ESRD)<sup>(9)</sup>.

### ETIOLOGY

Several factors may cause initiation of renal failure with its different types.

For acute renal failure : 60% of cases caused by Hypotension , sepsis, hemorrhage , failure of heart or liver , and several

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drugs such as NSAIDs and cyclosporine and these factors known as Prerenal<sup>(10)</sup>.

Approximately 35% of cases produce from extended prerenal failure which brings about an episode of Acute tubule necrosis. Another causes acute interstitial nephritis, vasculitis, rhabdomyolysis and arteriolar insults. All these conditions are known as Intrarenal<sup>(11)</sup>

The rest 5% approximately represented as Postrenal may result from several factors such as hypertrophy of prostate, , tumor, calculus, carcinoma, neurogenic bladder, clot, and stricture.<sup>(12)</sup>

Other causes of acute renal failure may result as a complication from surgeries or injuries and accidents. Also, it may result from overdoses of chemicals that accumulated from chemotherapy or antibiotics <sup>(13)</sup> Acute kidney failure may result from accidental causes known as crush syndrome in which toxins in large amounts increased suddenly in the blood causing ischemia . It is thought that these toxins were initiated by the collapse of skeletal muscles such as potassium, and phosphorus and myoglobin as a consequence of damaged from ischemic conditions. This condition is not fully understand but it explained as a case of nephrotoxic metabolites of myoglobin.<sup>(14)</sup>

This type of renal failure may improve but the patient needs support and treatment to acquire its normal function and they may still be in danger of initiation of kidney failure in the future<sup>(15)</sup>.

For Chronic Renal Failure the main causes are diabetes mellitus type2 and Hypertension first common cause.<sup>(16)</sup>

The second common causes are Glomerulonephritis, Polycystic kidney diseases and Renal vascular diseases. Other identified causes, such as nephrolithiasis , persistent obstruction of the urinary tract, Vesicoureteral reflux, pyelonephritis , and Recurrent kidney infections .<sup>(17)</sup>

Other causes include over doses of some drugs such as ibuprofen, and paracetamol or infection with some viruses that attack of kidney such as Hantavirus.<sup>[43] [44]</sup>Some patients suffering from chronic kidney failure as a result of hereditary predisposition where APOL1 gene optimizes the major gene that is responsible for the incidence of chronic renal failure in patients who don't have diabetes<sup>(18)</sup>

### Pathophysiology

At the first time several events occur during acute renal failure and over time gradually progress to chronic renal failure <sup>(19)</sup>

The blood flow in the renal tissues at a rate greater than the amount of blood circulation that streams into the liver ,brain and heart where the rate of blood reaches to 400 ml /100 grams of tissue per minute, so it is exposed to large amounts of harmful substances <sup>(20)</sup> .

The main section that signifies the major steps in the normal function of the kidney is Glomerular filtration, where acts on filtration of blood from the circulatory with its downloaded substances such as toxins and salts and the hyperfiltration or

hypertension of the glomerular capillaries lead to progress of chronic kidney failure <sup>(21)</sup>.

There is a negative charge found in the glomerular filtration membrane which acts as an obstruction that inhibits passage of anionic macromolecules and any disruption in this barrier leads to access for proteins across the glomerular filtration <sup>(19)</sup>.

Other parts of kidney also participate in convey abnormal material to the epithelial cells of the tubular in the kidney.

Generally renal failure classified into three categories:  
First : pre-nephrotic azotemia : reduction in renal blood flow  
Second : kidney azotemia : Autoimmune parenchymal kidney disease

Third : post-renal azotemia: obstruction of urine flow. 49;50

### Epidemiology

In general, renal failure is more prevalent across the world and it prevalent in men than in women, especially the final stages of the renal disease where in the United States there were annually infected 100000 of people. <sup>(22)</sup>

According to ethnicity, the final stages of Renal disease is prevalence 3-4 times more than whites. There were 209 patients per million with acute renal insufficiency inhabitants annually, 36% of them required renal replacement therapy<sup>[53]</sup>. Kidney disease is more increased with Population growth where the dialysis patients were more than million worldwide and annually it is reach to a quarter of a million in the United States <sup>(23)</sup>.

The percentage of chronic kidney disease elevated from 12% to 14% between 1994 to 2004<sup>[55]</sup>. The prevalence of chronic renal disease is elevated in people aged more than 65 in the United States of America for time between 2000 and 2008<sup>[56]</sup>. The percentage of frequency of kidney disease in African Americans is 3 times higher than in Caucasians <sup>(24)</sup>.

The main cause of kidney disease is high blood pressure and diabetes. Throughout the years, indicated a gradual elevation in the number of people suffering from diabetes and 44% of these patients entering the end stage of renal failure (ESRF). Cystic nephritis and glomerulonephritis is also relatively constant as a cause of end-stage renal disease. Diabetes is the main cause of kidney disease, which is in its final stages all over the world and in both developed and developing countries <sup>(25)</sup>. The occurrence of renal failure in its final stages in Australia was additionally affected by: Diabetes was about 25%<sup>(26)</sup>, and in the European Union, was about 15% \_33%, while patients who were affected because of glomerulonephritis was about 9% -20%<sup>(27)</sup>There are many possible causes that cause CKD in Africa that make kidney disease stressful, but in addition to infectious and non-infectious diseases such as leishmaniasis, schistosomiasis, infectious glomerulonephritis, and HIV infection, which is frequent and cause CKD, and that is because nearly more than 22 million who are infected with HIV in sub-Saharan Africa which creates the enormous burden of CKD .Chronic kidney disease continues to appear to be a chronic disease in the world <sup>(28)</sup>.

## Renal Failure, Types, Causes and Etiology: A Review Article

Conclusion: Renal failure is lethal condition and it is more prevalence in the world. It is complex and several factors complicated and causes its chronic type.

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## Renal Failure, Types, Causes and Etiology: A Review Article

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