Cauvery College for Women (Autonomous)

Nationally Accredited (III Cycle) with 'A' Grade by NAAC

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Programme :Bsc., Nutrition & Dietetics

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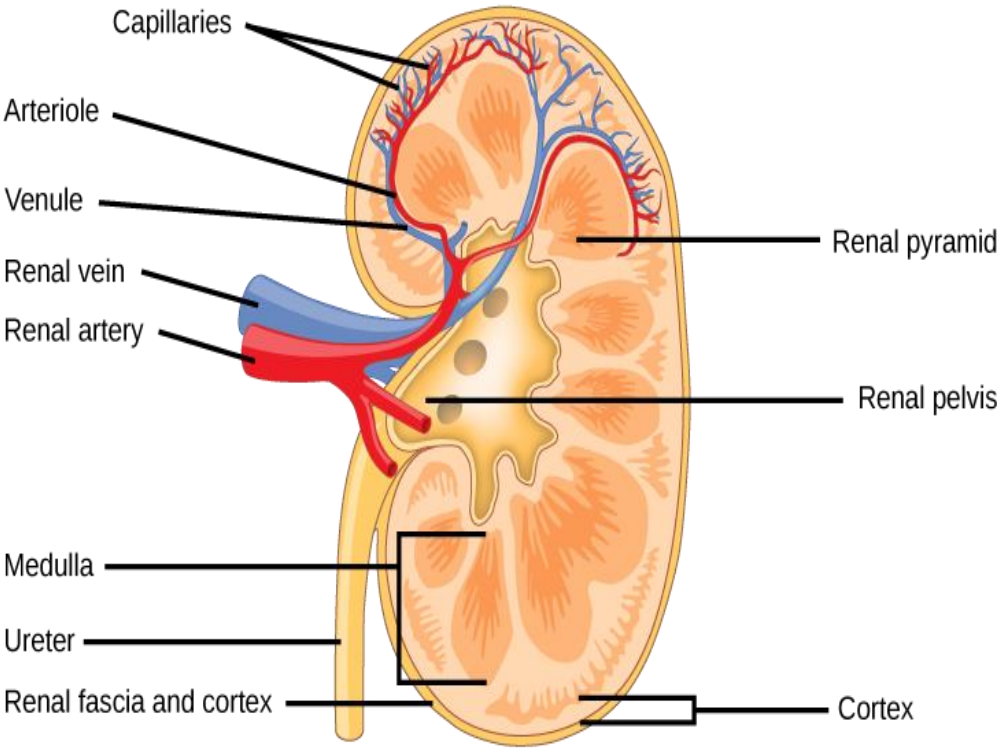
Unit :II

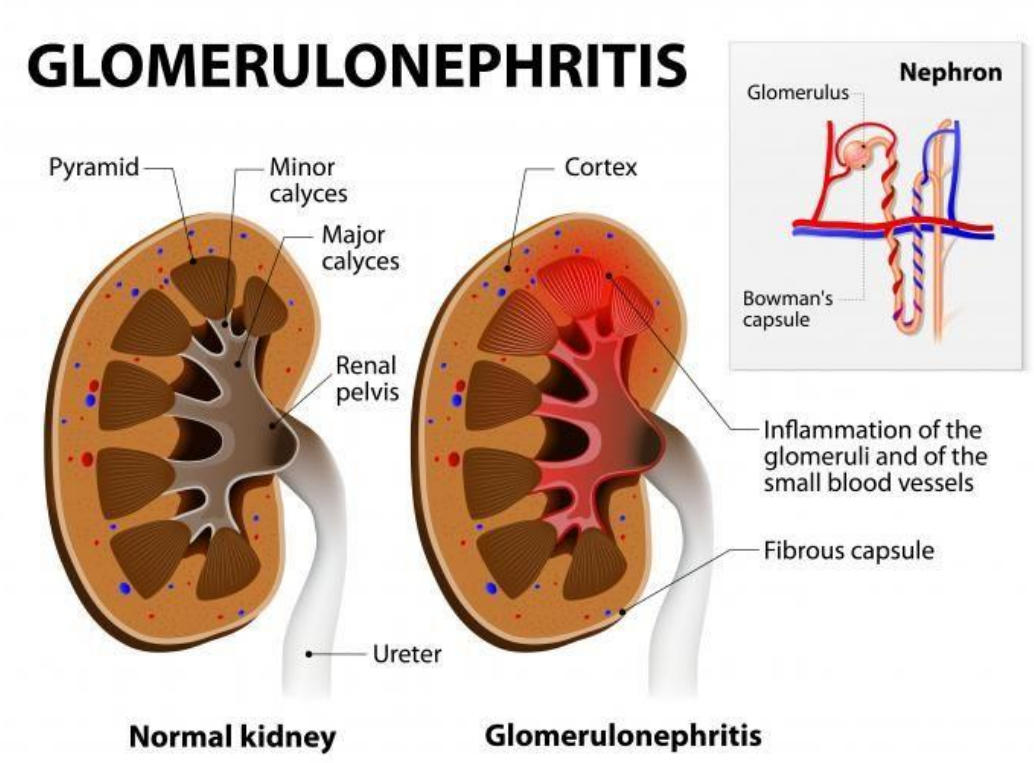
Topics Covered :Renal Disorders

Glomerulonephritis

Glomerulonephritis is a disease of the kidneys in which there is inflammation of the filtering units, called glomeruli. This inflammation can cause protein and red blood cells to leak into the urine while toxins normally removed by the kidney are retained in the body. Kidney failure develops when the kidney becomes less effective at filtering out waste products, water and salt from the blood.

Glomerulonephritis is inflammation of the glomeruli, which are structures in kidneys that are made up of tiny blood vessels. These knots of vessels help to filter blood and remove excess fluids. If glomeruli are damaged, kidneys will stop working properly, and leads to kidney failure.





The following are positive steps to recover from GN and prevent future episodes:

- Maintain a healthy weight.
- Restrict salt in diet.
- Restrict protein in diet.
- Restrict potassium in diet.
- Quit smoking.

Complications associated with Glomerulonephritis

- acute kidney failure
- chronic kidney disease
- electrolyte imbalances, such as high levels of sodium or potassium
- chronic urinary tract infections

- congestive heart failure due to retained fluid or fluid overload
- pulmonary edema due to retained fluid or fluid overload
- high blood pressure
- malignant hypertension

Symptoms of Acute Glomerulonephritis

- puffiness in face
- urinating less often
- blood in urine, which turns urine a dark rust color
- extra fluid in lungs, causing coughing
- high blood pressure

Symptoms of Chronic Glomerulonephritis

- blood or excess protein in urine
- high blood pressure
- swelling in ankles and face
- frequent nighttime urination
- foamy urine, from excess protein
- abdominal pain

Diet and Nutrition

A healthy diet for Nephrotic Syndrome patients consists of low salt, low fat and low cholesterol, with emphasis on fruits and vegetables.

NOTE: The amount of protein and fluid a patient with Nephrotic Syndrome should have depends on the patient's current condition, age and weight. It is very important that a nephrologist and/or a renal dietitian be consulted. This fact sheet is meant to be used as a resource and is not meant to replace medical advice.

Healthy Diet:

- Low sodium (salt) – helps with swelling in the hands and legs
- Lots of fresh fruit and vegetables – fiber such as whole grains, fruits and vegetables can help lower total and LDL cholesterol
- Low fat (1% or skim) dairy products
- Lean cuts of meat, less red meat, more chicken and fish
- SOMETIMES fluids should be restricted, as determined by a nephrologist
- SOMETIMES protein levels should be increased or decreased, as determined by a nephrologist
- RARELY should potassium or phosphorous be restricted, only if kidneys are failing and as determined by a nephrologist

Sodium:

- Too much sodium can contribute to high blood pressure and edema
- Most sodium in our diet comes from processed foods and salt
- We have learned to like salt and it takes time to unlearn the preference for salt
- Most people consume too much sodium on a daily basis

Role of sodium in the body

Sodium contributes to:

- Regulating blood pressure and blood volume
- Helps in regulating nerve function and muscle contraction
- Regulating the acid-base balance of blood
- Balances how much fluid the body keeps or eliminates

Why should kidney patients monitor sodium intake?

Too much sodium can be harmful for people with kidney disease because their kidneys cannot eliminate excess sodium and fluid from the body. As sodium and fluid build up in the tissues and bloodstream it may cause:

- Increased thirst
- Edema: swelling in your legs, hands and face
- High Blood Pressure
- Heart failure: excess fluid in the bloodstream can overwork your heart making it enlarged and weak
- Shortness of breath: fluid can build up in the lungs, making it difficult to breathe

How can patients monitor their sodium intake?

- Always read food labels, sodium is always listed.
- Pay close attention to serving size.
- Use fresh, rather than packaged meats.
- Choose fresh fruits and vegetables or no salt added canned and frozen produce.
- Avoid processed foods.
- Compare brands and use items lowest in sodium.
- Use spices that do not list “salt” in their title (choose garlic powder, instead of garlic salt).
- Cook at home and do NOT add salt
- Limit total sodium content to 400 mg per meal and 150 mg per snack

Protein:

- We need protein for overall health, muscle maintenance, and to fight infections
- Research has not absolutely proved benefit of low protein diet to preserve kidney function
- Goal is moderate protein intake, but consult with a nephrologist

- Good sources of protein are lean meats, will trimmed poultry, eggs (limit 2 per week), fish, shellfish, beans, and nuts

Fat and cholesterol:

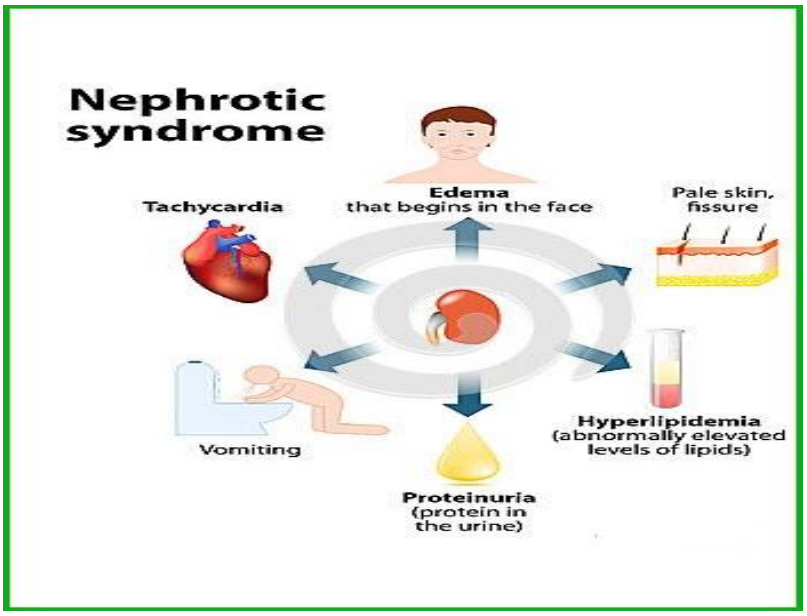
- Limit whole eggs to 2 per week, use egg substitutes or whites only
- Use lean meats, well trimmed, poultry w/o skin, fish, shellfish, beans, nuts
- Use healthy oils such as olive, canola, coconut, or sunflower
- Limit saturated fats (dairy, animal fat) and eliminate trans fat (partially hydrogenated oils found in processed and fast food)

Nephrotic syndrome

Nephrotic syndrome is a kidney disorder characterised by high levels of protein in the urine and swelling of body tissue. People of any age can be affected by nephrotic syndrome, although children aged between 18 months and four years are at increased risk. Long-term nephrotic syndrome can lead to irreparable kidney damage leading to kidney failure, necessitating treatment with dialysis or, eventually, kidney transplant.

Nephrotic syndrome produces a collection of symptoms and signs that occur because tiny blood vessels (the glomeruli) in the kidneys sustain damage and do not function correctly. The syndrome is characterised by abnormally high levels of protein in the urine (particularly one called albumin) and abnormally low protein levels in the blood. This often leads to fluid retention in the body tissues causing swelling (oedema) and can be associated with high blood cholesterol levelsand highbloodpressure.

The glomeruli act as filters to remove waste products from the blood, which are then excreted from the body in the urine. In nephrotic syndrome these filters become defective and leak, allowing large quantities of protein to be lost in the urine. Protein in the blood acts to prevent water entering the body's cells. Reduced blood protein levels cause water to leak into body tissue, causing swelling.



Signs and symptoms include:

- Foamy urine
- Fatigue and weakness
- Swelling, especially around the eyes, hands, feet, and abdomen
- Loss of appetite
- Increased weight from fluid retention
- High protein levels in the urine and low protein levels in the blood

As the condition progresses there may be:

- Susceptibility to infectious diseases due to an impaired immune system
- An increased risk of blood clots (thrombosis)
- Muscle wasting (due to the loss of protein)
- Malnourishment
- Weakening of the bones
- Abnormally low or abnormally high blood pressure
- High blood cholesterol levels
- Kidney failure.

Differential diagnosis of nephrotic and nephritic syndrome *

NEPHROSIS	NEPHRITIS
• Urine: proteinuria (>3.5g, v. 40mg/m2/h) • Serum: hypoproteinemia, hypalbuminemia, hypercholesterinemia	• Urine: hematuria, proteinuria, erythrocyte casts • Serum: normal total protein level

Nephritis /Nephrosis

- 'itis
  - Glomerular inflammation
  - Hematuria
  - Proteinuria
  - RBC casts
  - Hypertension
  - Renal Insufficiency
  - Edema
- 'osis
  - ↑ Glomerular capillary wall permeability
  - Proteinuria
  - Hypoalbuminemia
  - Edema
  - Hyperlipidemia
  - Lipiduria

Kidney failure

- Kidneys are the organs that filter waste products from the blood. They are also involved in regulating blood pressure, electrolyte balance, and red blood cell production in the body.
- Symptoms of kidney failure are due to the build-up of waste products and excess fluid in the body that may cause weakness, shortness of breath, lethargy, swelling, and confusion. Inability to remove potassium from the bloodstream may lead to abnormal heart rhythms and sudden death. Initially kidney failure may cause no symptoms.
- Some causes of kidney failure are treatable and the kidney function may return to normal. Unfortunately, kidney failure may be progressive in other situations and may be irreversible.
- The diagnosis of kidney failure usually is made by blood tests measuring BUN, creatinine, and glomerular filtration rate (GFR).
- Treatment of the underlying cause of kidney failure may return kidney function to normal. Lifelong efforts to control blood pressure and diabetes may be the best way to prevent chronic kidney disease and its progression to kidney failure. As we age, kidney function gradually decreases over time.
- If the kidneys fail completely, the only treatment options available may be dialysis or transplant.

Signs and symptoms

Initially, kidney failure may be not produce any symptoms (asymptomatic). As kidney function decreases, the symptoms are related to the inability to regulate water and electrolyte balances, clear waste products from the body, and promote red blood cell production.

If unrecognized or untreated, the following symptoms of kidney failure may develop into life-threatening circumstances.

- Lethargy
- Weakness
- Shortness of breath
- Generalized swelling (edema)

- Generalized weakness due to anemia
- Loss of appetite
- Lethargy
- Fatigue
- Congestive heart failure
- Metabolic acidosis
- High blood potassium (hyperkalemia)
- Fatal heart rhythm disturbances (arrhythmias) including ventricular tachycardia and ventricular fibrillation
- Rising urea levels in the blood (uremia) may lead to brain encephalopathy, pericarditis (inflammation of the heart lining), or low calcium blood levels (hypocalcemia)

Causes

Kidney failure may occur from an acute situation that injures the kidneys or from chronic diseases that gradually cause the kidneys to stop functioning.In acute renal failure, kidney function is lost rapidly and can occur from a variety of insults to the body. Since most people have two kidneys, both kidneys must be damaged for complete kidney failure to occur. Fortunately, if only one kidney fails or is diseased it can be removed, and the remaining kidney may continue to have normal kidney (renal) function. If a both patient's kidneys are injured or diseased, a donor kidney(s) may transplanted.

Pre renal causes (pre=before + renal=kidney) causes are due to decreased blood supply to the kidney. Examples of pre renal causes of kidney failure are:

- Hypovolemia (low blood volume) due to blood loss
- Dehydration from loss of body fluid (for example, vomiting, diarrhea, sweating, fever)
- Poor intake of fluids
- Medication, for example, diuretics ("water pills") may cause excessive water loss
- Abnormal blood flow to and from the kidney due to obstruction of the renal artery or vein.

Acute kidney failure

- Sepsis
- Medications -Some medications are toxic to the kidney including:
  - Nonsteroidal anti-inflammatory drugs (NSAIDs)
  - Antibiotics
  - lithium
  - Iodine-containing medications such as those injected for radiology dye studies
- Rhabdomyolysis
- Multiple myeloma
- Systemic lupus erythematosus
- Hemolytic uremic syndrome
- Postrenal kidney failure causes
- Kidney stones

Chronic kidney failure

Chronic renal failure develops over months and years. The most common causes of chronic renal failure are related to

- poorly controlled diabetes,
- poorly controlled high blood pressure, and
- chronic glomerulonephritis.
- Polycystic kidney disease
- Reflux nephropathy (damage caused by urine backflow from the bladder into the ureters and kidney)
- Nephrotic syndrome
- Alport's disease
- Interstitial nephritis
- Kidney stones
- Prostate disease

Treatment for kidney failure

Prevention is always the goal with kidney failure. Chronic diseases such as hypertension (high blood pressure) and diabetes are devastating because of the damage that they can do to kidneys and other organs. Lifelong diligence is important in keeping blood sugar and blood pressure within normal limits. Specific treatments depend upon the underlying diseases.

Once kidney failure is present, the goal is to prevent further deterioration of renal function. If ignored, the kidneys will progress to complete failure, but if underlying illnesses are addressed and treated aggressively, kidney function can be preserved, though not always improved.

Diet is an important consideration for those with impaired kidney function. Consultation with a dietician may be helpful to understand what foods may or may not be appropriate.

In this state of impaired kidney function, the kidneys cannot easily remove excess water, salt, or potassium from the blood, so foods high in potassium salt substitutes may need to be consumed in limited quantities. Examples of potassium rich foods include:

- Bananas
- Apricots
- Cantaloupe
- Sweet potatoes
- Yogurt
- Spinach
- Avocados

Phosphorus is a forgotten chemical that is associated with calcium metabolism and may be elevated in the body in kidney failure. Too much phosphorus can leech calcium from the bones and cause osteoporosis and fractures. Examples of foods and beverages high in phosphorus include:

- Milk
- Cheese
- Nuts
- Dark cola drinks
- Canned iced teas

- Yogurt
- Organ meets
- Sardines
- Oysters
- Baked beans
- Black beans
- Lentils
- Kidney beans
- Soy beans
- Bran cereals
- Caramels

Dialysis

Dialysis cleanses the body of waste products in the body by use of filter systems.
There are two types of dialysis, 1) hemodialysis, and 2) peritoneal dialysis.

Hemodialysis uses a machine filter called a dialyzer or artificial kidney to remove excess water and salt, to balance the other electrolytes in the body, and to remove waste products of metabolism. Blood is removed from the body and flows through tubing into the machine, where it passes next to a filter membrane. A specialized chemical solution (dialysate) flows on the other side of the membrane. The dialysate is formulated to draw impurities from the blood through the filter membrane. Blood and dialysate never touch in the artificial kidney machine.
For this type of dialysis, access to the blood vessels needs to be surgically created so that large amounts of blood can flow into the machine and back to the body. Surgeons can build a fistula, a connection between a large artery and vein in the body, usually in the arm, that allows a large amount of blood flow into the vein. This makes the vein swell or dilate, and its walls become thicker so that it can tolerate repeated needle sticks to attach tubing from the body to the machine. Since it takes many weeks or months for a fistula to mature enough to be used, significant planning is required if hemodialysis is to be considered as an option.

If the kidney failure happens acutely and there is no time to build a fistula, special catheters may be inserted into the larger blood vessels of the arm, leg, or chest. These catheters may be left in place for weeks. In some diseases, the need for dialysis will be temporary, but if the expectation is that dialysis will continue for a prolonged period of time, these catheters act as a bridge until a fistula can be planned, placed, and matured.

Dialysis treatments normally occur three times a week and last a few hours at a time. Most commonly, patients travel to an outpatient center to have dialysis, but home dialysis therapy is becoming an option for some.

Outpatient dialysis is available on some cruise ships. They are equipped with dialysis machines with trained health care professionals ready to care for those with kidney failure while traveling.

Peritoneal dialysis uses the lining of the abdominal cavity as the dialysis filter to rid the body of waste and to balance electrolyte levels. A catheter is placed in the abdominal cavity through the abdominal wall by a surgeon, and it is expected to remain in place for the long-term. The dialysis solution is then dripped in through the catheter and left in the abdominal cavity for a few hours after which, it is drained out. During that time, waste products leech from the blood flowing through the lining of the abdomen (peritoneum), and attach themselves to the fluid that has been instilled by the catheters. Often, patients instill the dialysate fluid before bedtime, and drain it in the morning.

There are benefits and complications for each type of dialysis. Not every patient can choose which type he or she would prefer. The treatment decision depends on the patient's illness and their past medical history along with other issues. Usually, the nephrologist (kidney specialist) will have a long discussion with the patient and family to decide what will be the best option available.

Dialysis is lifesaving. Without it, patients whose kidneys no longer function would die relatively quickly due to electrolyte abnormalities and the buildup of toxins in the blood stream. Patients may live many years with dialysis but other underlying and associated illnesses often are the cause of death.

Kidney transplant

If kidney failure occurs and is non-reversible, kidney transplantation is an alternative option to dialysis. If the patient is an appropriate candidate, the healthcare professional and nephrologist will contact an organ transplant center to arrange evaluation to see whether the patient is suitable for this treatment. If so, the search for a donor begins. Sometimes, family members have compatible tissue types and, if they are willing, may donate a kidney. Otherwise, the patient will be placed on the organ transplant list that is maintained by the United Network of Organ Sharing. Not all hospitals are capable of performing kidney transplants. The patient may have to travel to undergo their operation. The most successful programs are those that do many transplants every year.

While kidney transplants have become routine, they still carry some risk. The patient will need to take anti-rejection medications that reduce the ability of the immune system to fight infection. The body can try to reject the kidney or the transplanted kidney may fail to work. As with any operation, there is a risk of bleeding and infection.

Kidney transplants may provide better quality of life than dialysis. After one year, 95% of transplanted kidneys are still functioning and after five years, the number is 80%. It seems that the longer a patient is on dialysis, the shorter the life of the transplanted kidney.

If the transplanted kidney fails, the alternative is another kidney transplant or a return to dialysis.