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# A SYSTEMATIC REVIEW ON KIDNEY, IT'S AILMENTS AND IT'S TREATMENT

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## ABSTRACT
The kidney is an essential excretory organ of our body which plays a dominant role in homeostasis by excreting the metabolic waste products. Kidney disease is one of the common causes of hospitalization in most of the countries. Acute Renal failure is a common and serious renal problem having high morbidity and mortality rate. Increase in the levels of blood urea and creatinine is the principal diagnostic criteria of renal failure. -Glomerular diseases encompass a large and clinically significant group of renal diseases. Glomerulonephritis is the term used for diseases that primarily involves the renal glomeruli.
-Tubulointerstitial diseases are clinically heterogeneous disorders that share similar features of tubular and interstitial injury. In severe and prolonged cases, the entire kidney may become involved, with glomerular dysfunction and even renal failure.
-Nephrolithiasis or urolithiasis is formation of urinary calculi at any level of urinary tract.Types of urinary calculi include calcium stones, mixed (struvite), uric acid and cysteine stones and a few rare type.
-Renal vascular diseases: Renal blood flow is controlled by systemic and local hemodynamics, hormonal and intrinsic intra-renal mechanism. Diseases which disturb these controlling mechanism gives rise to renal vascular lesion.
In this study an attempt has been made to thoroughly review the treatments of the diseases related to kidney through various medications like Allopathy & Herbal drugs along with their mechanism of action, their side effects, drug-drug interactions and dose.

**KEYWORDS:** kidney, herbal drugs, allopathy drugs.

## INTRODUCTION
The kidneys are reddish brown bean shaped paired organs; about 11cm long, 6cm wide,3cm thick and each weighing about 150gm in adult male and about 135gm is adult female. The kidneys lie on the posterior abdominal wall, one on each side of the vertebral column,behind the peritoneum and below the diaphragm. They extend from the level of 12$^{th}$ thoracic vertebra to the 3$^{rd}$ lumbar vertebra receiving the same protection from the lower rib cage. The right kidney is usually slightly lower than the left, probably because of the considerable space occupied by the liver. A sheath of fibrous connective tissue, the renal fascia, encloses the kidney and the renal fat.

### Anatomy of kidney
**A-external anatomy:** The concave medial border of each kidney faces the vertebral column, near the center of the concave border is an indentation called the renal hilum, through which the ureter emerges from the kidney along with blood vessels, lymphatic vessels and nerves.

There are three layers of tissue which surrounds each kidney.
1-The deep layer is the renal capsule is a smooth transparent sheet of dense irregular connective tissue.

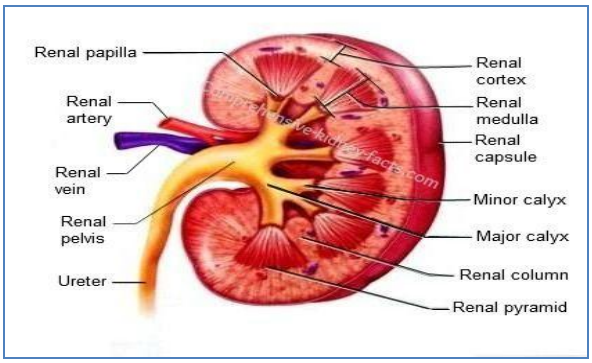
2- The middle layer is the adipose capsule is a mass of fatty tissue surrounding the renal capsule. 3- The superficial layer is the renal fascia is another thin layer of dense irregular connective tissue. On the anterior surface of the kidneys, the renal fascia is deep to peritoneum.

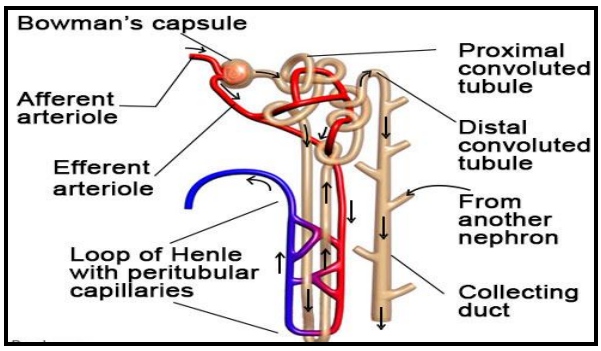
### B- Internal anatomy
A frontal section through the kidney reveals two distinct regions, a superficial light red area called the renal cortex and the deep darker reddish brown inner region called the renal medulla.

- The renal medulla consists of several cone shaped renal pyramids. The base of each renal pyramid faces the renal cortex and its apex called as renal papilla, point towards renal hilum.

• The renal cortex is the smooth textured area extending from the renal capsule to the bases of the renal pyramids and into the spaces between them. It is divided into outer cortical zone and inner juxta medullary zone. These portions of the renal cortex that extend between renal pyramids are called as renal column. A renal lobe consists of renal pyramids, its overlying area of renal cortex and one half of each adjacent renal column.

• Together the renal cortex and renal pyramids of the medulla constitute the parenchyma of the kidney. Within the parenchyma are the functional units of kidney about 1 million microscopic structures called nephrons. Urine formed by nephrons drains into large papillary ducts which extend through the renal papillae of the pyramids. The papillary ducts drains into a cup like structures called major and minor calyces. Each kidney has 8 to 10 minor calyces and 2 to 3 major calyces. A minor calyx receives urine from the papillary duct of one renal papillae and delivers it to a major calyx. From the major calyces, urine drains into a single large cavity called the renal pelvis and then throughout the ureter to the urinary bladder. The hilum expands into a cavity within the kidney called the renal sinus which contains part of the renal pelvis, calyces, branches, of the renal nerves. Adipose tissue helps to stabilize the position of the structure in the renal sinus.




**Types of Kidney Disease:** Diseases of kidney initially evolve from the predominant involvement of one of the morphological components (glomeruli, tubules, interstitum, blood vessels), but eventually all components are affected leading to end stage kidneys. Major groups of renal diseases are as follows.

**1. Glomerular diseases:** These are the most often immunologically mediated and may be acute or chronic.

**2. Tubular diseases:** These are more likely to be caused by toxic or infectious disease.

**3. Interstitial diseases:** These are likewise commonly due to toxic and infectious diseases and quite often involve interstitum as well as tubules.

**4. Vascular disease:** These include changes in the nephron as a consequence of increased intra-glomerular pressure such as in hypertension or impaired blood flow.

**1. Glomerular Diseases**

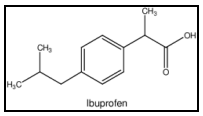
Glomerular diseases encompass a large and clinically significant group of renal diseases. Glomerulonephritis is the term used for diseases that primarily involves the renal glomeruli. A number of clinical syndromes are recognized in glomerular diseases. Following are four major diseases: -nephritic and nephrotic syndrome; -acute and chronic renal failure.

**Nephritic Syndrome:** Acute nephritic disease that involves mainly the glomeruli and to lesser extent the tubules by an acute transient inflammatory process. This is the acute onset of microscopic haematuria, mild proteinuria, hypertension, oedema and oliguria.

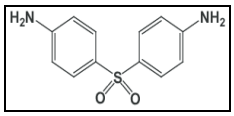
**Nephrotic Syndrome:** Nephrotic syndrome is an illness consisting in leakage of proteins in urine, resulting in life threatening conditions due hypovolemic, hyper coagulation, and infection. It is characterized by findings of massive proteinuria, hypoalbuminaemia, oedema, hyperlipidaemia, Lipiduria, and hypercoagulability.

**Drugs treatment**

**1. Ibuprofen**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | The mechanism of action by which ibuprofen closes the patent ductus arteriosus is through inhibition of prostaglandin synthesis. | Skin lesion Hypocalcaemia, Hypoglycemia, Disorder of gastrointestinal tract, Anemia, Ventricular hemorrhage, Renal impairment, Respiratory tract infection. | -Betamethasone Interaction Effect: increased risk of gastrointestinal ulcer or bleeding. -Amikacin Interaction Effect: increase amikacin exposure. | No dosage adjustment is recommended for patients with renal dysfunction or failure. |

**2. Dapsone**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | The mechanism of action of the sulfones is similar to that of the sulfonamides. Sulfonamides are competitive antagonists of para aminobenzoic acid (PABA) and prevent normal bacterial utilization of PABA for the synthesis of folic acid. | Peeling of skin, Agranulocytosis, Toxic hepatitis, Hypersensitivity reaction, Peripheral motor neuropathy. | -Zidovudine Interaction Effect: hematologic toxicity (neutropenia) -Rifampin Interaction Effect: decreased dapsone effectiveness. | The dose is 50 milligrams twice daily. |

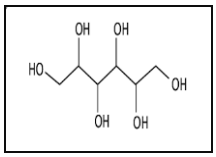
**Herbal Treatment**

| Herbal Drug | Biological Source | Chemical Constituents | Mechanism of Action | Uses |
|---|---|---|---|---|
| 1.Ginger | Ginger consists of whole or cut, dried scrapped or unscarpped *rhizomes of zingeber officianale roscoe*, belonging to family zingiberaceae. | Ginger consists of monoterpene hydrocarbon, sesquiterpene hydrocarbon, oxygenated mono and sesquiterpens and phenyl propanoids. | It inhibits serotonin receptors and cholinergic (M3) receptor activities and exerts its antiemetic effects directly on the gastrointestinal system and in the central nervous system. | gastrointestinal disorders like indigestion, nausea, morning sickness and motion sickness. As an anti-inflammatory agent, arthritis and osteoporosis. |
| 2.Ashwagandha | It consists of dried roots and stem bases of *withania somnifera(Linn.)Dunal* , belonging to family solanaceae. | The main constituents of ashwagandha are alkaloids and steroidal lactones. The main constituent is withanine. The other alkaloids include somniferine, somnine,somniferinine, withananine and anhydrine. | It plays a role in decreasing serum urea and creatinine levels and normalize the kidney weight against gentamicin toxicity, which may be due to its inhibition of generating and Scavenging free radical. | Sedative and hypnotic, Immune-modulatory agent, Stimulant, Anti-oxidant agent. |
| 3.Guduchi | *Tinospora cordifolia* commonly named as *"Guduchi"* belonging to family Menispermaceae is a genetically diverse, large, deciduous climbing shrub with greenish yellow typical flowers. | The main constituent are Tinocordiside, Tinocordifolioside, Cordioside, Cordifolioside A, Cordifolioside B, Palmatosides C, Palmatosides F, Cordifoliside A, Cordiofoliside B, Cordifoliside C, Cordiofoliside D, Cordifoliside E. | It decreases the level of urea nitrogen in blood as well as protein in urine and also decreases the level cytokinins, TNF-α. | Anti-inflammatory,anti-arthritic, antioxidant, immuno-modulatory. |
| 4.Punarnava | It consists of fresh as well as dried herb *Boerhaavia diffussa Linn* belonging to family Nyctaginaceae. | Punarnava contains about 0.04-1 % of alkaloid known as punarnavine, Phenolic glycoside, Punernavoside and boervanione A,B,C and D. | The mechanism of action is it corrects uremia,and improve the renal function which is evident by reduction in serum creatinine and other blood parameters. | Diuretic , Expectorant, Stomachic |

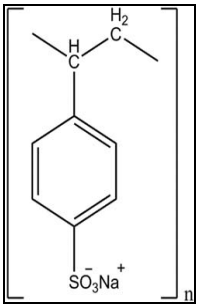
**Acute Renal Failure:** Acute kidney injury is a complex clinical disorder that is associated with severe morbidity and mortality. Acute renal failure encompasses several clinical syndromes characterized by a rapid decrease in the glomerular filtration rate. In acute renal failure the RAAS, the renal sympathetic system and the tubuloglomerular feedback systems are activated. The etiology of AKI was divided into three categories: prerenal, renal and postrenal.

**Drugs Treatment**

**Mannitol**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Mannitol is classified as an osmotically active solute diuretic which when administered is accompanied by an increase in urine output. This increase in urinary flow is achieved by a nonelectrolyte solute diuresis. The mechanism of action of mannitol is both the osmotic inhibition of water transport in the proximal tubule and a subsequent decreased gradient for passive sodium absorption in the ascending limb of the loop of Hennle. It also has been shown to increase glomerular filtration rate. | Cardiovascular: Chest discomfort, Gastrointestinal: N ausea, Neurologic: Dizziness, Respiratory: Cough, Dyspnea, Throat irritation Wheezing, Neurologic: Seizure, Renal: Renal failure (rare), Urinary retention. | Arsenic Trioxide - Interaction Effect: increased risk of QT-interval prolongation and torsade de pointes. Licorice - Interaction Effect: increased risk of hypokalemia and/or reduced effectiveness of the diuretic. | Dosage in renal failure: For IV injection, use a test dose; a second test dose may be tried if there is an inadequate response, but no more than 2 test doses should be attempted. |

**Sodium Polystyrene Sulfonate**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | It reduces serum potassium levels by binding potassium ions in the GIT, thus increasing fecal $K^+$ excretion while reducing free $K^+$ in the lumen. $Na^+$ counter ions are released from the resin in the GIT and replaced by $K^+$. This activity occurs primarily in the large intestine, where $K^+$ ions are excreted to a greater degree than in the small intestine | Gastrointestinal: Co nstipation, Nausea, Vomiting. Endocrine: Hypervolemia, Hypokalemia Gastrointestinal: Fec al impaction, Gastrointestinal hemorrhage, Gastrointestinal necrosis, Ischemic colitis Respiratory: Bronchitis, Bronchopneumonia. | Aluminum Carbonate: - Interaction Effect: an increased risk of systemic alkalosis. Lithium: -Interaction Effect: decreased absorption and efficacy of lithium. | Normal Dose: Oral route 15 to 60 g/day given as 15 g orally once to 4 times daily. Rectal route 30 to 50 g rectally every 6 hours. |

**Herbal Treatment**

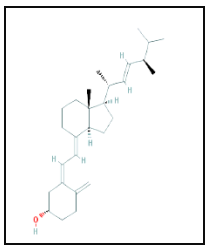
| Herbal Drug | Biological Source | Chemical Constituents | Mechanism of Action | Uses |
|---|---|---|---|---|
| 1. Ginseng | Ginseng is a dried root of various species of panax like *P.ginseng, p.japonica, P.notoginseng* belonging to family – Araliaceae. | Ginseng contains a mixture of several saponin glycosides belonging to triterpenoid group. They include ginsenosides, Panaxosides ,chikusetsusaponin. | Ginsenosides can inhibit Reactive oxygen species production, stimulate Nitric oxide production, increase immune function, enhance central nervous system function, and prevent cardiovascular or other diseases. | Immunomodulatory Stimulant , Sedative, Demulcent |
| 2.Senna | It consists of dried leaflets of *cassia angustifolia or cassia senna vahl* belonging to family leguminosae. | Senna contains mainly two anthraquinone glycosides called as sennosides A and sennosides B which accounts for purgative property. | Senna, have a direct action on intestinal mucosa, increasing the rate of colonic motility, enhancing colonic transit, and inhibiting water and electrolyte secretion. These agents have stool softening properties and do not disrupt the usual pattern of defecation. | Purgative. |
| 3.Ginger | Ginger consists of whole or cut, dried scrapped or unscarpped rhizomes of *zingeber officianale roscoe*, belonging to family zingiberaceae . | Ginger consists of monoterpene hydrocarbon, sesquiterpene hydrocarbon, oxygenated mono and sesquiterpens and phenyl propanoids. | It inhibits serotonin receptors and cholinergic (M3) receptor activities and exerts its antiemetic effects directly on the gastrointestinal system and in the central nervous system. | gastrointestinal disorders like indigestion, Nausea, morning sickness and motion sickness. As an anti-inflammatory agent, arthritis and osteoporosis. |

**Chronic Renal Failure:** The term "chronic kidney disease" means lasting damage to the kidneys that can get worse over time. This is called kidney failure, or end-stage renal disease (ESRD). The disease can be classified into two major groups those causing glomerular pathology and those causing tubulo interstitial pathology. In the final stage of chronic renal failure, all the parts of nephrons are involved.

**Drugs Treatment**

**1. Ergocalcefirol**

**Table 2.1.4.1.1: Structure, mechanism of action, adverse effects, drug -drug interaction, dose of ergocalcefriol.**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Ergocalciferol, or vitamin D, promotes active absorption of calcium and phosphorus, thus increasing serum calcium and phosphate levels sufficiently to allow bone mineralization. It also mobilizes calcium and phosphate from bone and increases the reabsorption of calcium and phosphate by the renal tubules. | Constipation, Loss of appetite, Nausea, Hypercalcemia, Hypervitaminosis D. | Bendroflumethiazide -Interaction Effect: decreased systemic ergocalciferol (vitamin D) exposure. Aluminum Hydroxide - Interaction Effect: aluminum toxicity (personality changes, seizures, coma) | Normal Dose: Levels less than 5 ng/mL. |

**2.1.4.2: Herbal Treatment**

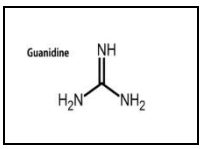
| Herbal Drug | Biological Source | Chemical Constituents | Mechanism of Action | Uses |
|---|---|---|---|---|
| 1. Astragalus and decoction of Astragalus with Angelica sinensis. | The medicinal herb Astragalus is derived from the root of Leguminosae plant *Astragalus membranaceus* or *Astragalus mongholicus.* | It contains more than 60 components including polysaccharides, saponins (astragalosides I~VII), flavonoids, amino acids, and trace elements. | Astragalus is known to inhibit CYP3A4 and can affect the metabolism of certain drugs metabolized by the enzyme. Astragaloside IV were analyzed using a computer-assisted target identification program, which identified 39 putative targets including calcium influx inhibition, vasodilatation, anti-thrombosis, anti-oxidation, anti-inflammation, and immune regulation. | diuresis, antioxidation, and Anti-inflammation. |
| 2.Decoctions of and Radix bupleuri components of Radix bupleuri | *Radix Bupleuri*, also called "Chaihu" in Chinese, is derived from the dried roots of *Bupleurum chinense*DC. and *Bupleurum scorzonerifolium* Willd | The active constituents include Saikosaponin a, Saikosaponin c, Saikosaponin d, Saikosaponin e, Prosaikogenin G, Prosaikogenin F. | Saireito suppresses inflammatory and proliferation of mesangial cells and inhibits (NOS), (COX-2), (TNF)-α, and (IL)-6 (LPS), (NF), matrix synthesis. | Anti-inflammatory and immune-modulatory activities. |

**Tubular and Tubulointerstitial Diseases:** Tubulointerstitial diseases are clinically heterogeneous disorders that share similar features of tubular and interstitial injury. In severe and prolonged cases, the entire kidney may become involved, with glomerular dysfunction and even renal failure.

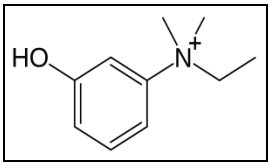
**Acute Tubular Necrosis:** Acute tubular necrosis is the destruction of tubular epithelial cells. Based on etiology and morphology, acute tubular necrosis two forms are ischemia and toxic. The disease typically progress through 3 characteristic stages: oliguria, diuretic, phase of recovery.

**Drugs Treatment**

**1. Guanidine**

| structure | mechanism of action | adverse effects | drug-drug interactions | dose |
|---|---|---|---|---|
|   | following a nerve impulse, guanidine hydrochloride enhances acetylcholine release and also slows the rate of depolarization and repolarization of muscle cell membranes, which reduces muscle weakness and fatigability | atrial fibrillation<br>hypotension<br>tachycardia<br>dry skin<br>ecchymosis<br>flushing<br>rash<br>sweating<br>abdominal cramps<br>diarrhea<br>loss of appetite<br>nausea | bupropion<br>-interaction effect: lower seizure threshold<br>amifampridine<br>-interaction effect: increased risk of seizures | initial dosage: 10 to 15 mg/kg/day orally in 3 or 4 divided doses |

**2. Edrophonium**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Edrophonium is a Para sympathomimetic, anticholinesterase agent that is rapidly reversible. Edrophonium binds the enzyme acetyl cholinesterase, thus preventing the enzyme from binding acetylcholine. This action causes the accumulation of acetylcholine at cholinergic synapses. | Cardiac arrest Cardiac dysrhythmia, Laryngospasm, Bronchospasm, Paralysis of respiratory muscles, and central respiratory muscles | Donepezil -Interaction Effect: reduced seizure threshold Succinylcholine -Interaction Effect: increased neuromuscular blockade | Dose of edrophonium is 10 mg (1 mL) |

**Herbal Treatment**

| Herbal Drug | Biological Source | Chemical Constituents | Mechanism of Action | Uses |
|---|---|---|---|---|
| 1.Glycyrrhiza glabra | It consists of dried unpeeled roots and stolon of *glychrizza glabra* belonging to family leguminosae. | The chief constituent is triterpenoid saponin known as glycyrrhizin, glycyrrhetinic acid, and carboxelone. | It acts through three assay systems. Its reactivity with free stable 1,1'-diphenyl-2-picrylhydrazyl (DPPH) radical, (DOPC) liposomes, and inhibition of ROS. | Expectorant, Demulcent, Supportive care, Renal dysfunction treatment. |
| 2.Artemisia | This consists of Chinese herb *Artemisia annua Linn.* , family asteraceae. | The chief constituents are artemisinin, artemisinic acid, and deoxyartemisinin | The mechanism includes Activation of artemisinin & production of free radicals, Target of heme polymerization, Protein targets. | Antimalarial, Anti-inflammatory, Supportive care, Renal dysfunction treatment. |

**Tubulointerstitial Disease**

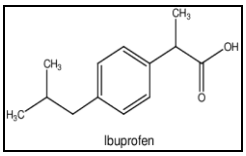
Tubulointerstitial disease is characterized by an immune-mediated infiltration of the kidney interstitium by inflammatory cells, leading to non-oliguria or oliguria acute kidney injury. The most common cause of toxic ischemia necrosis is related to a medication or drug exposure. Tubulointerstitial disease can be categorized based on underlying etiology, histology, or duration. The important examples include acute pyelonephritis, chronic pyelonephritis etc.

**There are five concepts that support this view**

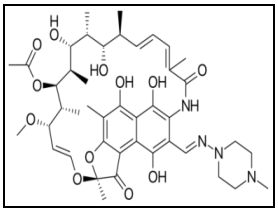
(1) Tubulointerstitial nephritis only occurs in a small proportion of individuals taking a certain medication;
(2) There is no dose-dependence;
(3) Patients develop systemic manifestations of a hypersensitivity reaction;
(4) Tubulointerstitial nephritis can recur after re-exposure to the drug and
(5) Eosinophil is often present on renal biopsy. This process likely involves cellular immunity, as there are seldom immune deposits noted by immunofluorescence on renal biopsies in patients with toxic ischemia necrosis.

**Drugs Treatment**

**1. NSAID: eg-Ibuprofen.**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Ibuprofen most likely produces anti-inflammatory, antipyretic, and analgesic effects by inhibition of prostaglandin synthesis. | Congestive heart failure, Hypertension, Hypotension, Alopecia, Rash, Urticaria. | Acebutolol - Interaction Effect: increased blood pressure. Aspirin - Interaction Effect: decreased antiplatelet effect of aspirin and additive risk of bleeding. | 400 mg IV every 4 to 6 hours as needed. |

**2. Antimicrobials: eg-RIFAMPIN**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | It inhibits bacterial RNA synthesis by binding strongly to the beta subunit of DNA-dependent RNA polymerase, preventing attachment of the enzyme to DNA, and thus blocking initiation of RNA transcription. | Hepatotoxicity, Anaphylaxis, Hypersensitivity reaction | Aceclofenac -Interaction Effect: decreased exposure of diclofenac. Buspirone -Interaction Effect: reduced anxiolytic effects. | 600 mg (about 10 mg/kg) IV once daily. |

**Herbal Treatment**

| Herbal Drug | Biological Source | Chemical Constituents | Mechanism of Action | Uses |
|---|---|---|---|---|
| 1.Rhubarb | Rhubarb consists of dried rhizome of *Rheum emodi Wall, Rheum palmatum Linn*, family polygonaceae. | The active constituents include hydroxyanthracene derivatives, anthraquinones, tannins and calcium oxalate. Rhubarb root contains 2% to 5% anthraquinone derivatives like rhein,emodin, palmidin A,B,C. | The direct action of aloe-emodin and rhein on intestinal cell membranes and the indirect action of emodin on bowel movement through the adjustment by nervous system. | Bitter stomachic, Purgative, Treatment of diarrhea. |
| 2.Arabinogalactan | Arabinogalactan is a biopolymer consisting of arabinose and galactose monosaccharides. | Arabinogalactan is composed of two monomers, D-galactose and L-arabinose. | It has been suggested that it can interact with the immune system either indirectly through the production of short chain fatty acids,As that affect inflammatory responses via leukocytes function and cytokine production, or directly through the capacity of M-cell | Common cold infections; Dietary fibers; Immune system enhancer, diuretic. |

**Obstructive Uropathy**

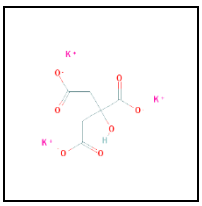
Obstruction in the urinary tract is common and important because it increases the susceptibility to infection and stone formation. Obstruction may occur at any age and in either sex. The cause of obstruction may lie at any level of the urinary tract-renal pelvis, ureter, urinary bladder and urethra. The most common disease is nephrolithiasis.

**Nephrolithiasis**

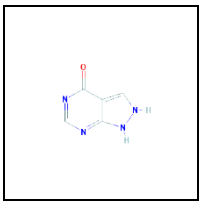
Nephrolithiasis or urolithiasis is formation of urinary calculi at any level of urinary tract. Urinary calculi are worldwide in distribution and are characterized clinically by colicky pain as they pass down along the ureter and manifest by haematuria. Types of urinary calculi include calcium stones, mixed (struvite), uric acid and cysteine stones and a few rare types.

**Drug Treatment**

**1. Potassium Citrate**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Potassium citrate reduces crystallization of stone-forming salts (calcium oxalate, calcium phosphate and uric acid) within the urinary bladder by increasing the urinary pH and raising urine citrate levels | Cardiac arrest, Hyperkalemia, Gastric mucosal erosion. | Aluminum Phosphate-Interaction Effect: aluminum toxicity (encephalopathy) Trovafloxacin Mesylate-Interaction Effect: reduced efficacy of Trovafloxacin | 10 mEq orally 3 times daily OR 15 mEq orally 2 times daily. |

**2. Allopurinol**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Allopurinol sodium and its metabolite, oxypurinol decrease the production of uric acid by inhibiting the action of xanthine oxidase, the enzyme that converts hypoxanthine to xanthine and xanthine to uric acid. Allopurinol sodium also increases reutilization of hypoxanthine and xanthine for nucleotide and nucleic acid synthesis. It decreases uric acid concentrations in both serum and urine by inhibiting uric acid formation. | Pruritus, Agranulocytosis, Eosinophil count raised, Thrombocytopenia, Granulomatous hepatitis , Hepatic necrosis, Hypersensitivity reaction, Renal failure. | Aluminum Hydroxide - Interaction Effect: decreased allopurinol effectiveness Azathioprine -Interaction Effect: azathioprine toxicity (nausea, vomiting, leukopenia, anemia) Didanosine -Interaction Effect: increased serum concentrations of didanosine. | 200 mg to 300 mg orally daily in single or divided doses. |

**Herbal Treatment**

| Herbal Drug | Biological Source | Chemical Constituents | Mechanism of Action | Uses |
|---|---|---|---|---|
| 1.Pimpinella anisum (anise) | Anise is the dried fruit of *Pimpinella anisum L.* (Apiaceae). | 50–70 % petroselinic acid, 22–28 % oleic acid, 5–9 % linoleic acid and 5–10 % saturated fatty acids mostly palmitic acid, myristicin; *trans* (E)-anethole, Methylchavicol (estragole) , anise ketone (para-methoxyphenyl-acetone) and β-caryophyllene. | Reduce volume of urine by increased activity of the renal $Na^+$-$K^+$-ATPase. | carminative, aromatic, disinfectant, Antibacterial, Anticonvulsant. |
| 2.Parsley | Parsley is biennial herb of European origin, *Petroselinum crispum*, which is extensively cultivated for its leaves, belonging to family Apiaceae, or Umbelliferae | Main components include myristicin (36.15%), apiole (20.97%), α-pinene (15.47%), and β-pinene (10.43%). | The mechanism of action of parsley is mediated through an inhibition of the Na+-K+ pump that would lead to a reduction in Na+ and K+ reabsorption leading to an osmotic water flow into the lumen. | Carminative, gastro tonic, diuretic, antiseptic of urinary tract, anti-urolithiasis, anti-dote and anti-inflammatory and for the treatment of amenorrhea. |

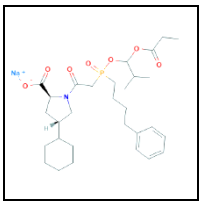
**Renal Vascular Disease**

Renal blood vessels which enormously perfuse the kidney are affected in majority of renal diseases. Renal blood flow is controlled by systemic and local hemodynamics, hormonal and intrinsic intra-renal mechanism. Diseases which disturb these controlling mechanism gives rise to renal vascular lesion. These diseases are as follows:

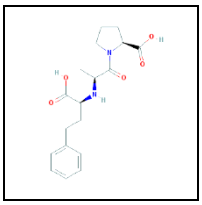
a.Hypertensive vascular disease
b.Thrombotic microangiopathy
c. Renal cortical necrosis
d. Renal infracts

**Drugs Treatment**

**1. Fosinopril Sodium**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Renal blood flow is maintained as a balance of both angiotensins II induced vasoconstriction and prostaglandin mediated vasodilation. With angiotensin converting enzyme (ACE) inhibitor therapy, kidney perfusion is increased and renal vascular resistance is decreased as ACE inhibitors induce vasodilation in both afferent and efferent arterioles. Glomerular filtration rate (GFR) will generally increase. | Acute renal failure, Azotemia, Oliguria, Hypotension, Hyperkalemia, Nausea, vomiting , Dizziness , Cough. | Azathioprine -Interaction Effect: myelosuppression Phenylbutazone -Interaction Effect: renal dysfunction and/or increased blood pressure Pioglitazone - Interaction Effect: increased risk of hypoglycemia | 10 to 40 mg orally once daily |

**2. Enalaprilat**

| Structure | Mechanism of action | Adverse effects | Drug-drug interactions | Dose |
|---|---|---|---|---|
|  | Enalaprilat is an angiotensin converting enzyme (ACE) inhibitor that prevents the conversion of angiotensin I to angiotensin II. The reduced amount of angiotensin II results in decreased vasopressor activity and aldosterone secretion. | Abnormal renal function, Serum blood urea nitrogen raised, Serum creatinine raised, Angioedema, Fatigue, Fever, Constipation, Nausea. | Allopurinol -Interaction Effect: hypersensitivity reactions (Stevens-Johnson syndrome, skin eruptions) Spironolactone - Interaction Effect: hyperkalemia Bupivacaine -Interaction Effect: bradycardia and hypotension with loss of consciousness. | 1.25 mg IV over 5 minutes every 6 hours, up to 5 mg/dose. |

**Herbal Treatment**

| Herbal Drug | Biological Source | Chemical Constituents | Mechanism of Action | Uses |
|---|---|---|---|---|
| 1.caraway | Caraway consists of the dried ripe fruits of *carm carvi Linn*, family umbelliferae. | Caraway contains 2.5 to 8% volatile oil, about 10% of fixed oil, 15% of proteins and resins. Volatile oil contains 45 to 65% of carvone, limonene, dihydrocarvone and traces of carvacol. | The mechanism of caraway includes renin angiotensin system which plays a role in regulation of blood pressure.renin acts on angiotensinogen to form angiotensin1 which is converted to angiotensin-II with the help of ACE. | Diuretic, Aromatic, Stimulant. |
| 2.oilves | It is the fixed oil expressed from the ripe fruit of *olea europoea Linne*, belonging to family oleaceae. | The olive oil contains the triglycerides mainly in the form of olein, palmitin and liolein. | Olives are known to increase renal glutathione content and also increases renal anti-oxidant enzymes activity. | Nutrient, Mild laxative, Treatment of urinary diseases, Diuretics. |

## CONCLUSION

Kidney disease is one of the common causes of hospitalization in most of the countries. Its damage can be occurred due to prolonged use and higher doses of drugs, exposure to some chemicals, toxins, or infectious agents. This review was done by analyzing the pathophysiology of various diseases through books, published journals etc. the aim of this review is to create awareness among the people regarding the most emerging and frequent kidney diseases, their pathophysiology and drugs used in the specific treatment. This review also highlights the herbal treatment of kidney diseases. Herbal medicines have the perspective to treat with more benefits and less side effects. Nephrolithiasis the most common and emerging disease in people can be treated through herbal drugs like parsley, anise, and asparagus etc. guava can also be used in treatment of kidney stones but scientific research is going on. The prophetic medicine ( tibb e nawabi) one of the oldest medicinal practice during the period of prophet Muhammad(PBUH) like talbina, olives ,ajwain, kalonji, honey, barley water rasinis etc can also be used in treating disorders. Very few people in today's world have knowledge about this medicine. Workshops,

seminars, research work should be conducted to revive this medicinal practice so that the entire mankind gets benefited from prophetic medicine.

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