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A Critical review on commonly used herbal drugs in CKD

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Abstract

The kidneys are two bean-shaped organs that extract waste from blood, balance body fluids, form urine, and aid in other important functions of the body. The main role of the kidneys is to filter waste products from the blood before converting them into urine. The kidneys also help maintain blood pressure, maintain the correct levels of chemicals in your body which, in turn, will help heart and muscles function properly, produce the active form of vitamin D that keeps bones healthy, produce a substance called erythropoietin, which stimulates production of red blood cells.

Chronic kidney disease is the reduced ability of the kidney to carry out these functions in the long-term. This is most often caused by damage to the kidneys from other conditions, most commonly diabetes and high blood pressure.

A new model predicts that about half of all people aged 30 and older in the United States will develop chronic kidney disease during their lifetimes, a surprisingly large proportion for a condition that is not on the radar screens of many Americans.

CKD is more common in people of south Asian origin (those from India, Bangladesh, Sri Lanka and Pakistan) and black people than the general population. The reasons for this include higher rates of diabetes in south Asian people and higher rates of high blood pressure in African or Caribbean people.

We are not all equal with regard to kidney disease and access to treatment. Some communities in both higher and lower income countries are at greater risk than others because of their ethnic origin, socioeconomic status and/or where they live. This has major public health implications because of the terrible impact of kidney failure.

Tectona grandis, *Sesamum indicum*, *Hemidesmus indicus*, *Orthosiphon stamineus*, *Achyrocline satureioides*, *Zingiber officinalis*, *Teminalia chebula* etc.

Keywords: CKD, nephrons, hemodialysis, hyperuricemia, nephroprotective, diuresis, Glomerulonephritis etc.

1. Introduction

Chronic kidney disease (CKD) is a progressive loss in kidney function over a period of months or years. Each of your kidneys has about a million tiny filters, called nephrons. If nephrons are damaged, they stop working. For a while, healthy nephrons can take on the extra work. But if the damage continues, more and more nephrons shut down. After a certain point, the nephrons that are left cannot filter your blood well enough to keep you healthy.

Renal disorders have always remained a major area of concern for physicians since a long time. It is the 9th leading cause of death in United States. Incidence of kidney diseases leading to kidney failure is increasing day by day. A large number of chemicals in common use are potential renal toxins. The use of herbal drugs for the prevention and treatment of various diseases is constantly developing throughout the world.

Acute renal failure is a life threatening illness whose mortality has remained high since the introduction of hemodialysis 25 years ago, despite advances in supportive care. Acute renal failure is an extremely morbid and costly disorder with a significant proportion of patients progressing to end-stage renal disease requiring dialysis. To the nephrologists, acute renal failure remains an extremely frustrating disease, because the patho physiology is not well understood and the limited therapeutic options force the nephrologists to sit on the sidelines and wait for renal function to return. For example, dialysis remains the only FDA-approved treatment for acute renal failure, but dialysis may also cause renal injury that prolongs renal failure.

The prevalence of chronic renal disease is increasing worldwide. Most chronic nephropathies lack a specific treatment and progress relentlessly to end-stage renal disease.

The prevalence of chronic kidney disease is high in developing countries. The prevalence of chronic kidney disease was high in north and southwest regions compared with other regions. Other factors independently associated with kidney damage were age, sex, hypertension, diabetes, history of cardiovascular disease, hyperuricemia, area of residence, and economic status. Chronic kidney disease has become an important public health problem in China. Special attention should be paid to residents in economically improving rural areas and specific geographical regions in China.

It is found that some commonly used Nephroprotective drugs are Milk thistle (*Silybum marianum*) seeds, Picroliv (*Picrorhiza kurroa*, *Astragalus (Astragalus membranaceus)*, *Cordyceps (Cordyceps sinensis)*, *Salvia miltiorrhiza* root extracts, *Herniaria hirsuta* aqueous extracts [1].

In Ayurveda CKD, described as a *mootra dosh vikar* and causes of edema. Both Kidney are root of *medovaha srotas* [2].

According to Acharya charak the causes of *mootra dosha vikar* are vitiated by the intake of drinks and food, sexual intercourse while having the urge for micturition, and suppression of the urge of micturition, disorders of wasting or malnutrition and severe traumatic injury [3].

The pathogenesis of kidney disease is not separately mentioned. It can be included in *prameha*, *mutra dosha*, *mutra krichha*, injury of *vankshana*, *Ashmari* (stone diseases) and *odema (Sotha)* etc. In charak samhita described that Kidney and bladder are the root (controlling organ) of the channels carrying urine and fat, the opening of these channels get affected by fat, *mansa* and liquid *dhatu*s of the body. The vitiated *doshas* while coming in contact with the opening of these channels obstructs them. This result in the manifestation of kidney disease. Which become chronic or incurable due to the affection of all the qualities of *doshas* and also due to the simultaneous vitiation of homogenous and heterogenous *dhatu*s [4].

In modern parameter the causes of CKD are many, approximately 40% of CKD patients have the disease as a result of diabetes, 30% have it as a result of hypertension, and 10% have it as a result of a disease called glomerulonephritis. Diabetes mellitus is the most common cause of CKD. Diabetes, a disease that disrupts the way the body uses blood sugar (glucose), can lead to kidney damage and CKD. The high levels of sugar damage the kidneys over several years, and results in a reduced ability to filter blood and excrete waste products in the urine.

High blood pressure that is ignored or inadequately treated for many years can lead to CKD. Hypertension, or high blood pressure, is a disorder that leads to damage of small blood vessels. When small blood vessels in the kidneys that filter the blood are damaged, kidney failure results.

CKD can result from a chronic kidney disease called glomerulonephritis, or from kidney infections. Glomerulonephritis may cause a small output of urine, the spilling of blood and protein into the urine, and body swelling. Long-term or repeated kidney infections can also damage the structure of the kidneys, reducing the kidney's capacity to filter blood.

Kidney stones and other blockages can lead to CKD. Any obstruction in the natural flow of urine causes a back-flow of pressure in the kidney, which can damage the kidney's functional units, the nephrons. This damage can occur slowly over several years, and can ultimately lead to CKD.

Over-the-counter and prescription medications can contribute to CKD. As like analgesics and certain powerful antibiotics act like poisons to the kidneys [5]. People with even mild kidney disease must be very careful about the prescription drugs and

non-prescription drugs they use.

Other diseases and conditions may lead to CKD as part of their natural progression. These include Alport syndrome, which is a rare kidney disease that causes kidney failure and hearing loss, lupus erythematosus, connective tissue diseases, kidney cancer, liver disease (cirrhosis), polycystic kidney disease, Obesity, smoking, Anaemia, malnutrition and abnormalities present at or before birth (congenital abnormalities).

2. AIMS and Object

The aim of choose the kidney disease is to raise awareness of the importance of our kidneys to our overall health and to reduce the frequency and impact of kidney disease and its associated health problems worldwide.

This study is carried out with an aim to review the recent study carried out on some common herbs used in India, china and other countries.

3. Materials and methods

This study is carried out by literature search and critical review of the obtained facts. The pathogenesis of kidney disease and various studies on herbs were obtained by searching various medical research databases like pub med, Google scholar, Embase and other national research databases. The terms entered for search are “kidney disease”, “chronic renal failure”, “acute renal failure”, and “nephropathy”, “nephroprotective drugs”, “renal disorder”, “nephrotoxic drugs”. Manual search was made by going through the reference list of retrieved articles to identify relevant additional study. The study of various Ayurvedic texts was made critically and a review of action of commonly used herbs in India, china and other countries.

4. Observations and discussion

The alcoholic and aqueous extracts of the *Hybanthus enneaspermus* possesses significant curative and preventive nephroprotective activity [6].

According to Acharya charak, *mootra dosh vikar* is tretised by *punarnava*, *haritaki*, *shunthi*, *nagarmotha*, *shilajeet*, *Gokshura*, *yavakshar* etc. *Kansharitaki* is also very helpful in *mootra dosha vikar* as well as *vata-kaph odema* [7].

Shilajeet is help ful with take *gomutra* in *mootra dosha vikar* [8].

Tectona grandis has the potential to treat diabetes mellitus and prevent the associated renal damage. Traditionally *Tectona grandis* is used in treatment of diabetes, lipid disorders, inflammation, ulcer, and bronchitis. *Tectona grandis* is reported to have antiulcer, antimicrobial, wound healing, anticancer, and anti-renal damage activity [9].

Chronic kidney disease (CKD) can be prevented or delayed by early treatment using angiotensin II-converting enzyme inhibitors and angiotensin II-receptor blockers. A great amount of the world's population has been using traditional Chinese herbal medicine (*astragalus*; *angelica*; *rhubarb*) for treatment of CKD [10].

Listed selected plants as like in table used by Aboriginal tribes all over Canada for kidney diseases. Mostly, these are used for diuresis, renal stones and cleansing the kidneys. A brief review of the literature shows different plants being effective in preventing/treating renal diseases. Some renal conditions reported to respond to plant therapy are glomerulonephritis, IgA nephropathy, membranous nephropathy, glomerulosclerosis, immune complex nephritis, nephrotic syndrome, lupus, tubule interstitial nephritis, chronic allograft nephropathy, kidney stones etc. Some pharmacological characteristics seen in plants that may contribute in the above-mentioned conditions are anti-inflammation; antioxidation;

diuresis; immunomodulation; prevention of acute allograft rejection and drug-induced nephrotoxicity; reduction in proteinuria, renal interstitial fibrosis, renal ischemia/reperfusion injury, tubular and mesangial cell

proliferation, blood lipid levels, blood pressure, lipid peroxidation, apoptosis, renal necrosis, and calcium oxalate crystal aggregation; and stimulation of renal repair mechanisms, RNA and protein synthesis [11].

Scientific name	Common name (plant type)	Family	Part used	Traditional use (preparation)
<i>Acer pensylvanicum</i>	Striped maple (tree)	Aceraceae	Bark	Diuretic (bark tea)
<i>Cornus canadensis</i>	Bunchberry (herb)	Cornaceae	Whole plant	Kidney problems (drinking steeped plant)
<i>Cucurbita</i> sp.	Squash (vine)	Cucurbitaceae	Seed	Diuretic (chewing seeds, seeds pulverized and taken with water)
<i>Larix laricina</i>	Tamarack (tree)	Pinaceae	Gum	Kidney problems (chewing of gum)
<i>Ledum groenlandicum</i>	Labrador tea (Shrub)	Ericaceae	Leaf	Kidney problems (leaves infusion)
<i>Medeola virginiana</i>	Cucumber root (herb)	Liliaceae	Crushed dried berry and leaf, root	Diuretic (berry and leaf infusion; chewing root)
<i>Pinus strobus</i>	White pine (tree)	Pinaceae	Bark, needle, twig	Kidney and urinary problems (tea of plant parts)
<i>Sarracenia purpurea</i>	Purple pitcher plant (herb)	Sarraceniaceae	Root	Kidney problems (drinking steeped root)

The therapeutic property of *Sesamum indicum* seeds propitious in improving nephropathy by significantly improving serum parameters and histopathological evidence also suggests the same. The seed contains appreciable amounts of various bioactive components including tocopherols, phytosterols, resveratrol and flavonoids, and the lignans sesamin and sesamol. The identification and management of early stage diabetic kidney disease is important, but the majority of people exhibit no symptoms until the disease is more advanced renal damage [12].

Hemidesmus indicus was found on study base that aqueous and methanolic extracts have more significant inhibitory effect on salt water feeding induced severity of microalbuminuria, serum urea and creatinine, myocyte diameter and retention of Na⁺ and water and increases the serum calcium level. It is potent natural nephroprotective also a cardioprotective [13].

Orthosiphon stamineus is the one of the important medicinal plant which used for kidney based Problems traditionally. The ethanolic extracts of *O. stamineus* leaves have been used for the nephroprotective activity. The whole plant of the *Orthosiphon stamineus* (cats whiskers) is used as gall bladder, kidney, liver, bladder problems, painful tooth, hypertension and genitourinary diseases. Cat's Whiskers is a perennial herb found mainly throughout south East Asia and tropical Australia. The herb is popularly known as Java tea. *O. stamineus* is used widely in the form of herbal tea among the South East Asian population [14].

Pharmacological properties of Polyphenols are found in the renal area, acting as diuretic, anti-inflammatory, antispasmodic, and antioxidant agents. Various polyphenolic compounds have been reported for their nephroprotective activity with a good level of renal protection. Therefore, considering the important role of polyphenolic compounds in the prevention or reduction of renal disorders induced by various nephrotoxic chemical agents, in this way, he was summarized the some antioxidant plants, such as, Achyrocline satureioides, Zingiber officinalis, Terminalia chebula etc having Nephroprotective properties [15].

Solanum nigrum was found that renal markers (urea, serum creatinine, uric acid) were brought back to normal. Thus it is inferred that *Solanum nigrum* preserves the functional capacity of the kidney against ethanol toxicity [16].

Launaea procumbens effectively protect kidneys as well as decreased Serum level of creatinine, urobilinogen, BUN, direct bilirubin, total bilirubin and globulin while total proteins, albumin, through antioxidant and free radical scavenging effects of flavonoids and saponins [17].

5. Conclusion

According to ayurveda CKD is a principal disorder who described in term of mutra dosh vikar and mentioned as a caused of edema. Treatment should be prescribed on focused kidney mainly in both conditions. Remedies should be diuretic as well as being electrolytes filtration. If do not filtered the electrolytes so they deposit in the kidney and having causes of kidney damage.

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