



REVIEW ON ROLE OF HERBAL DRUG IN THE PREVENTION AND MANAGEMENT OF KIDNEY DISEASE

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ABSTRACT

Kidney disease has always under concerned area since a long time specially in developing and under developing countries. It is one of the leading cause of death in world today. Incidence of kidney diseases leading to kidney failure is increasing day by day. The use of herbal drugs for the prevention and treatment of various diseases is now considered in thought throughout the world. A number of extracts of natural products have been reported to show protective effects against nephrotoxicity. Many herbal drugs have shown their potent nephroprotective effect due their antioxidant, diuretic, anti-inflammatory, antispasmodic properties. WHO has recently reported that traditional medicines have been existing in therapeutic practice even hundred years before the development of modern medicine. As herbs and herbal drugs have clinically proven effects like immunomodulation, adaptogenic and antimutagenic, they play a vital role in treatment of kidney diseases progressive to failure. Number of medicinal plants shows activity such as *Punarnava* & *Varun* reduces elevated blood urea & Serum Creatinine, *Shigru* & *Sariva* increase functional capacity like prevent renal injuries, helps improve haemopoiesis, *Kasni* restores electrolytic homeostasis like sodium and Pottasium, *Revand Chini* detoxify the effect like significantly reduces the deposition of 2,8-dihydroxyadenine content, *Shigru* acting as anti oxident, *Shirish*, *Amalaki*, *Haritaki*, *Punarnava* act as immunomodulator, *Papaya*, *Coriandar* reducing renal hypertention, *Makoi*, *Purnarnava* reduces oxidative stress. There are various evidences which revalidate the folklore use of traditional medicines and even be helpful in the development of future medicines, treatments and treatment guidelines of kidney disease.

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INTRODUCTION

Kidney has the essential function of removing waste and toxins from blood and regulating many other vital functions like maintaining fluid of the body which makes it a vital organ. When kidney damage occurs, body unable to rid of excess urine and wastes from the body and blood electrolytes (such as potassium and magnesium) will all become elevated.

Compared with 30 years ago, average life span has increased globally which means older patients with more disease. They have a higher incidence of life style disorder eg. diabetes and cardiovascular disease, take multiple medications, and are exposed to more diagnostic and therapeutic procedures with the potential to harm kidney function.^[1]

Drug-induced kidney disease constitutes an important cause of acute renal failure and chronic kidney disease in present day clinical practice. The incidence of drug-induced nephrotoxicity has been increasing with the ever increasing number of drugs and with easy availability of over the counter medication viz.

nonsteroidal anti-inflammatory drugs (NSAIDs). Antibiotics, NSAIDs, angiotensin converting enzyme inhibitors (ACEI) and contrast agents are the major culprit drugs contributory to kidney damage. Drug-induced acute renal failure (ARF) accounted for 20% of all ARF in an Indian study^[2] of which aminoglycosides accounted for 40% of total cases.

Changing life style created many diseases like diabetes and hypertension etc. which is a common cause of Kidney disease. According to Med India incidence of kidney failure has doubled the last 15 year and there are over 15 million people worldwide who are alive on dialysis or with a functioning graft. In India there are approximately 7.85 million people suffering from chronic renal failure and 90% of them are not able to afford the cost of treatment.^[3]

Thus prevalence of renal diseases is increasing globally. A number of therapeutic agents can adversely affect the kidney resulting in acute renal failure, chronic intestinal nephritis and nephritic.

Drug-Induced Nephrotoxicity: Drugs cause approximately 20 percent of community- and hospital acquired episodes of acute renal failure. [4-6] Among older adults, the incidence of drug-induced nephrotoxicity may be as high as 66 percent. [7] Although renal impairment is often reversible if the offending drug is discontinued, the condition can be costly and may require multiple interventions, including hospitalization. [8]

Most drugs found to cause nephrotoxicity exert toxic effects by one or more common pathogenic mechanisms. These include altered intraglomerular hemodynamics, tubular cell toxicity, inflammation, crystal nephropathy, rhabdomyolysis, and thrombotic microangiopathy. [9,10]

Table 1: Various Drugs which causes Kidney disease

Drug class/drug(s)	Pathophysiologic mechanism of renal injury
Analgesics	
Acetaminophen, aspirin	Chronic interstitial nephritis
Nonsteroidal anti-inflammatory drugs	Acute interstitial nephritis, altered intraglomerular hemodynamics, chronic interstitial nephritis, glomerulonephritis
Antidepressants/mood stabilizers	
Amitriptyline, doxepin, fluoxetine	Rhabdomyolysis
Lithium	Chronic interstitial nephritis, glomerulonephritis, rhabdomyolysis
Antihistamines	
Diphenhydramine, doxylamine	Rhabdomyolysis
Antimicrobials	
Acyclovir	Acute interstitial nephritis, crystal nephropathy
Aminoglycosides	Tubular cell toxicity
Amphotericin B	Tubular cell toxicity
Beta lactams (penicillins, cephalosporins)	Acute interstitial nephritis, glomerulonephritis (ampicillin, penicillin)
Quinolones	Acute interstitial nephritis, crystal nephropathy (ciprofloxacin)
Rifampin (Rifadin)	Acute interstitial nephritis
Sulfonamides	Acute interstitial nephritis
Antiretrovirals	
Adefovir, cidofovir, tenofovir	Tubular cell toxicity
Indinavir	Acute interstitial nephritis, crystal nephropathy
Cardiovascular agents	
Angiotensin-converting enzyme inhibitors, angiotensin receptor blockers	Altered intraglomerular Hemodynamics
Clopidogrel, ticlopidine	Thrombotic microangiopathy
Statins	Rhabdomyolysis
Chemotherapeutics	
Carmustine (Gliadel), semustine (investigational)	Chronic interstitial nephritis
Cisplatin	Chronic interstitial nephritis, tubular cell toxicity
Interferon-alfa (Intron A)	Glomerulonephritis
Methotrexate Crystal	Nephropathy
Mitomycin-C (Mutamycin)	Thrombotic microangiopathy
Contrast dye	Tubular cell toxicity
Diuretics	
Loops, thiazides	Acute interstitial nephritis
Drugs of abuse	
Cocaine, heroin, ketamine, methadone, methamphetamine	Rhabdomyolysis
Proton pump inhibitors Lansoprazole (Prevacid), Omeprazole (Prilosec), Pantoprazole (Protonix)	Acute interstitial nephritis

Medicinal plants have played a significant role in various ancient traditional systems of medication. Even today, plants provide a cheap source of drugs for majority of world's population.

Ayurveda will serve as a powerful search engine and most importantly, will greatly facilitate intentional, focused and safe natural products research to rediscover the drug discovery process. Some important medicinal

plants can be useful in management of Renal diseases are as follows.

Saunf (*Trigonella foenum-graecum*): Its seeds have been used by traditional herbalists for problems of kidney and male reproductive tract. *Trigonelline* (N-methylnicotinic acid, N-methyl betaine) is the major alkaloid phytoconstituent of fenugreek seeds act by suppression of oxidative stress in kidney and reduction in renal cell apoptosis and fibrosis. Increased diuresis, antioxidant activity and lowering of urinary concentrations of stone forming constituents are suggested mechanism for anti-urolithiatic effects of fenugreek seeds.^[11]

Kokilaksha (*Hygrophila spinosa*): The present study revealed that ethanolic extract of *H.auriculata* seeds significantly increased the urinary output as well as urinary electrolyte concentration at 500mg/kg. *H.auriculata* seed extract treated group showed an increase in Na⁺ & K⁺ concentrations which was more than that of frusemide treated group indicating that it has a better saluretic activity than frusemide.^[12]

Male Wistar rats treated petroleum ether extract of the heart wood of *Cedrus deodara* PECD (50, 100 and 200mg/kg), significantly increased the elimination of sodium and chlorides but they didn't show significant elimination of the potassium when compared to vehicle treated group. Results showed that single dose administration of PECD and furosemide increased the urine output, increase in sodium and chloride concentration. PECD 200 mg/kg showed greater diuretic activity which is comparable to that of furosemide (10 mg/kg).^[13]

Kali musli (*Curculigo orchioides*): The study was performed to evaluate the invitro antioxidant activity of ethanolic root extract of *Curculigo orchioides*. The results obtained indicates the significant antioxidant activity compared with standard reference drug Gallic acid.^[14]

Mulaka (*Raphanus sativus*):The aqueous extract of *Raphanus sativus* showed antilithiatic activity on implants of calcium oxalate crystals or zinc discs in the urinary bladder of rats. The effect however is unrelated to increased diuresis or to a change of the muscarinic receptor affinity of the bladder smooth musculature to cholinergic ligands.^[15]

Guduchi (*Tinospora cordifolia*): In a study antibacterial activity of aqueous, ethanol and chloroform extracts of leaves and stem of *Hook. F. Thoms* were tested on clinical isolates of urinary pathogens viz., *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris* and *Pseudomonas aeruginosa* by agar well diffusion method. Ethanol extract of leaf showed greater inhibitory action than other tested extracts.^[16] It has been claimed to possess antidepressant, antistress, learning and memory enhancing, antioxidant & diuretic effect. Diuretic effects may also reduce stone development when total fluid intake and output increased, and such effects have been attributed to several herbal preparations.^[17]

Haridra (*Curcuma longa*): The nephroprotective and diuretic effects of three medicinal herbs *Petroselinum*

sativum, *Eruca sativa* and *Curcuma longa*, alone and in combination were investigated against gentamicin induced nephrotoxicity in rats. The results showed that gentamicin induced nephrotoxicity was ameliorated by oral administration of aqueous infusion of *Petroselinum sativum*, *Eruca sativa* and *Curcuma longa* herbs.^[18]

Rutin and curcumin are the polyphenolic compounds present in turmeric, known to have antioxidant and anti-inflammatory activities. Supplementation of rutin and curcumin restored elevated levels of calcium and oxalate in the urine and kidney sample near to normal and showed minimum tissue damage and less number of calcium oxalate deposits in kidney of animal treated with rutin and curcumin as compared to calculi-induced animal. This effect is mediated possibly through a lowering of urinary concentration of stone forming constituents, anti-inflammatory and antioxidant effects.^[19]

Gokshura (*Tribulus terrestris*): The diuretic properties of *T. terrestris* are due to large quantities of nitrates and essential oil present in its fruits and seeds. The diuretic activity can also be attributed to the presence of potassium salts in high concentration. The aqueous extract of *T. Terrestris* prepared from its fruit and leaves in rat diuretic model and strips of isolated Guinea pig was evaluated. The aqueous extract of *T. terrestris*, in oral dose of 5 g/kg, elicited a positive diuresis, which was slightly more than that of furosemide. Sodium and chloride concentrations in the urine were increased. The increased tonicity of the smooth muscles, which was produced by *T. terrestris* extract, together with its diuretic activity helped in the propulsion of stones along the urinary tract.^[20]

Saurabh et al. evaluated the different extracts of *T. terrestris* fruits, viz. aqueous, methanolic, *Kwatha*-high strength, *Kwatha*-low strength, and *Ghana* powder, for diuretic activity in rats. *Kwatha*-high strength showed diuretic effect comparable to that of the reference standard frusemide and also exhibited additional advantage of potassium-sparing effect. The diuretic action of *Tribulus terrestris* makes it useful as an anti-hypertensive agent.^[21]

Shirish (*Albezzia lebbek*): Research work also depicts the protective effect of one traditionally used polyherbal formulation against the diabetes induced liver and pancreatic damage.^[22]

Amalaki (*Phyllanthus emblica*)

Results show that the leaves of *Ph. emblica* have inhibitory activity on PMNs and platelets, which confirm the anti-inflammatory and antipyretic properties of this plant as suggested by its use in traditional medicine.^[23]

The present study suggests that PE extract administration pretreatment for five days in dose 250 and 500 mg/kg/day before the induction of CI-AKI exerts significant renoprotective effects in a rat model of CI-AKI. These findings indicate that PE extract could represent a novel and effective preventive approach for CI-AKI as a result of its antioxidant capacity to preserve renal function and directly protect renal tissues. Investigation

with additional experimental studies and clinical trials is required to confirm to the advantage of PE extract to prevent the CI-AKI. [24]

Antioxidant effect of PE extract could decrease MDA in both plasma and renal tissues. Moreover, PE extract preserved plasma TAC and renal tissues TAC, SOD and CAT activities. These effects correlated with the attenuation of histopathological injury from contrast media administration. The dose dependent effect of PE extract started at dose 250 mg/kg/d and had the additional effect at dose 500 mg/kg/d similar to the antioxidant effect of vitamin E in the experimental study [25] and clinical trial. [26]

Haritaki (*Terminalia chebula*)- In a study in the liver and kidney of aged animals, enhanced oxidative stress was accompanied by compromised antioxidant defences. Administration of aqueous extract of *T. chebula* effectively modulated oxidative stress and enhanced antioxidant status in the liver and kidney of aged rats. The results of the present study demonstrate that aqueous extract of *T. chebula* inhibits the development of age-induced damages by protecting against oxidative stress. [27]

The extract of *T. chebula* has been reported to possess uraemic toxin decreasing action in rats. It lowers the serum concentration of urea nitrogen, creatinine, methyl guanidine and guanidino succinic acid significantly. [28]

Punarnava (*Boerhaavia diffusa*)- It is used in various renal disorders including calcium oxalate urolithiasis. Studies reveal that, the antioxidant activity significantly protects against hyperoxaluric oxidative stress and renal cell injury in urolithiasis. [29] Apart from this, *Punarnava* is proved to be nephroprotective agent. In an experimental study histopathological changes showed that acetaminophen caused significant structural damages to kidneys like tubular necrosis, degeneration of epithelial cells, glomerular damage and congestion which was reversed with *B. diffusa*. [30]

Varuna (*Crataeva nurvala*)- Stem bark of *varuna* tree contains a major component known as lupeol. The cytoprotective action of lupeol isolated from *C. nurvala* stem bark against free radical toxicity has been investigated in experimental urolithiasis. Lupeol administration induced a remarkable decrease in kidney oxalate level and also was effective in counteracting the free radical toxicity by bringing about a significant decrease in peroxidative levels and an increase in antioxidant status. These observations highlight the antioxidant property of lupeol and its cytoprotection against free radical toxicity. [31]

Barley (*Hordeum vulgare*)- It contains flavonoid i.e. saponarin which on hydrolysis gives equilibrium mixture of saponarin & vitexin, which is responsible for its antioxidant effect. Ethanolic extract of *H. vulgare* seeds (EHV) significantly reduced the urinary excretion of calcium, phosphate, uric acid, magnesium, urea, and oxalate and increased the excretion of citrate compared to EG control. It was also observed that the treatment with EHV produced significant decrease in lipid

peroxidation, and increased levels of superoxide dismutase and catalase and concluded that urolithiatic effect is due to antioxidant activity. [32]

Barley acts as antioxidant and anti-inflammatory and plays an important role in the protection from incidence of chronic renal failure. On the other hand some beverages made from barley have been used in Egypt as folk medicine to alleviate kidney dysfunction. Phytate, β -glucan, tocopherols and tocotrienols were reported to be present in barley seeds. [33]

Orange (*Citrus sinensis*)- In a study administration of the ethanol extract showed significant decreases in hematologic parameters and increases in animal body weight, liver, renal, lipid and glycemic parameters as well as vascular and inflammatory changes in liver and kidney, at high doses. The aqueous extract acted like an immune stimulator, with strong antioxidant activity. [34]

Pashanbheda (*Aerva lanta*)- The ethanolic extract of the entire plant of *Aerva lanata* was studied for its nephroprotective activity in cisplatin and gentamicin induced acute renal injury in albino rats. The results suggest that the ethanolic extract of *Aerva lanata* possesses marked nephroprotective activity with minimal toxicity and could offer a promising role in the treatment of acute renal failure caused by nephrotoxins like cisplatin and gentamicin. [35]

Ashwagandha (*Withania somnifera*)- *Ashwagandha* root possesses nephroprotective effect. In an experimental study it was observed that, the mean serum urea, creatinine levels were significantly ($p < 0.001$) higher in gentamicin treated control group in comparison to those of baseline control. Again, these levels were significantly ($p < 0.01$) lower in *Ashwagandha* pretreated and gentamicin treated group (experimental group) when compared to those of gentamicin treated group (control). [36]

Shigru (*Moringa oleifera*)- Methanolic extract of root was found to contain some alkaloids (total alkaloids 0.2%). Effects of multiple weekly (35, 46, 70 mg/kg) and daily therapeutic (3, 5, 4, 6, 7.0 mg/kg) ip doses of the crude extract (CE) on liver and kidney functions and hematological parameters in mice were studied. [37]

Manjistha (*Rubia cordifolia*)-

In a study the hydro-alcoholic extract of *Rubia cordifolia* was investigated against cisplatin induced nephrotoxicity in Swiss albino mice. Cisplatin at a dose of 12 mg/kg body wt was administered intraperitoneally while another set of animals were given hydro-alcoholic extract of *Rubia cordifolia* at different doses along with cisplatin treatment. The extract significantly decreased the cisplatin induced nephrotoxicity. The study concluded the nephroprotective role of hydro-alcoholic extracts of *Rubia cordifolia*. [38]

Brihat Gokshura (*Pedalium murex*)- Nephrotoxicity was induced in Wistar rats by intraperitoneal administration of cisplatin 5mg/kg. Effect of concurrent administration of *Pedalium murex* ethanolic extract at a dose of 250 mg/kg given by oral route was determined using serum creatinine and blood urea and change in

body weight as indicators of kidney damage. Cystone was used as standard drug. The study showed that the ethanolic extract of dried fruits of *Pedaliium murex* has an excellent nephroprotective activity as compared to cystone.^[39]

Sahadevi (*Vernonia cinerea*)- The alcoholic extracts of aerial parts of *Vernonia cinerea* has been examined for its effect on cisplatin induced nephrotoxicity at a dose of 6mg/kg, i.p. in albino rats. The alcoholic extract showed pronounced curative activity and the ethyl acetate extract has exhibited good prophylactic activity and petroleum ether extract showed moderate protection for both curative and prophylactic models against cisplatin-induced toxicity.^[40]

Shunti (*Zingiber officinale*)- Nephrotoxicity was induced by i.p. administration of gentamicin 100 mg/kg/day for eight days in wistar rats. Effect of concurrent administration of ethyl acetate extract and fresh juice extract of *Zingiber officinale* at a dose of 200 mg/kg/day given by oral route. Gentamicin-induced glomerular congestion, peritubular and blood vessel congestion, epithelial desquamation, accumulation of inflammatory cells and necrosis of the kidney cells were found to be reduced in the groups receiving the ethyl acetate and dried fresh juice extract of *Zingiber officinale* along with gentamicin. The study concluded that both extracts possess significant nephroprotective activity.^[41]

Ginger has been reported to possess a potent anti-oxidant activity in vitro which reduces the oxidative stress in the body. Administration of its ethanolic extract to ethylene glycol rats prevented super saturation of calcium oxalate and thus decreased their deposition in renal tubules due to active compound present in the extract.^[42]

Makoy (*Solanum nigrum*)- The extract of *S.nigrum* possesses significant nephroprotective activity. Nephrotoxicity was induced in Wistar rats by intraperitoneal administration of gentamicin 100 mg/kg/day for eight days. Effect of concurrent administration of fresh juice extract of *S. nigrum* at a dose of 100 mg/kg/day given by oral route was determined using serum creatinine, AST, ALT, blood urea, ALP, ACP, reduced glutathione, catalase, glutathione peroxidase and protein as indicators of kidney damage. The fresh juice extract of *S. nigrum* significantly protected rat kidneys from gentamicin-induced nephrotoxicity by normalizing the alterations in biochemical parameters.^[43]

Sariva (*Hemidescus indicus linn*)- The treatment with *H. indicus* helped in the management of renal impairment, which was induced by gentamicin in rats. This is evident from the results obtained for various kidney function tests for gentamicin, along with the results from the plant treated group, and is in comparison with the results found for the gentamicin recovery group. A histological examination of kidneys also supports the findings from haematological evaluations. The plant shows promise as an adjunct therapy alongside aminoglycosides as it reduces nephrotoxicity caused by aminoglycosides.^[44]

Corn silk (*Stigma maydis*) –It contain fatty acid 2.5%, volatile oil 0.12%, gum 3.8%, resin 2.7%, saponin 3.18%, alkaloids 0.05%, flavonoids, allantoin and moderate amount of zinc, potassium, calcium, phosphorus. The rationale behind its use for the treatment of kidney stones is that it reduces irritation, increases urine secretion & in addition, it possesses excellent antioxidant capacity. It was found that the alcoholic extract antiurolithiatic activity in dissolution of regenerated calcium oxalate crystals.^[45]

Revand Chini (*Rheum emodi*)- The renal effects of water-soluble (W-S) and water-insoluble (W-INS) portions of the alcoholic extract of *R. emodi* were investigated on cadmium chloride, mercuric chloride, potassium dichromate and gentamicin-induced nephrotoxicity in rats and normal rats by monitoring the levels of urea nitrogen and creatinine in serum. The present investigations provide evidences that W-S fraction has nephroprotective effect on all the proximal tubule segments (S1, S2 and S3) possibly through antioxidant action of the tannins present in the fraction. W-INS also improved the renal function by protecting S2 segment of proximal tubule nephrotoxicity induced by metals viz cadmium chloride and mercuric chloride in rat models, however, this fraction has been found to enhance gentamicin nephrotoxicity.^[46]

Papaya (*Carica papaya* Linn.) has nephroprotective effect on CCl₄ renal injured rats, an effect which could be mediated by any of the phytochemicals present in it via either antioxidant and/or free radical scavenging mechanism.^[47]

Crude ethanol extract was prepared from the unripened fruit of *Carica papaya* treated with extract. The mean arterial blood pressure (MAP) and the heart rate were measured in all assigned group and control. extract produced about 28% more depression of MAP than hydralazine in the hypertensive groups. In vitro study suggested that the fruit juice of *C. papaya* probably contains antihypertensive agent(s) which exhibits mainly alpha-adrenoceptor activity.^[48]

Kasni (*Cichorium intybus*): Treatment with polyphenolic extract of *C. Intybus* at a dose of 500 mg/kg b.w. partially protected the ion homeostasis altered by Cisplatin administration. Increased doses and time duration of herbal polyphenolic extract could function to reverse the toxic effect.^[49]

Dhanyaka (*Coriandum sativum*): coriander has been reported to exhibit antioxidant properties.^[50] Vasodilatory effects of coriander are well-established. Indeed, intravenous application of aqueous methanolic extract of dried, ground coriander seeds (1–30 mg/ml) produced a dose-dependent fall in SBP, DBP, and mean arterial blood pressure (MABP) in normotensive Sprague-Dawley rats by 40.84 ± 6.34%. The same report also showed that coriander fruit extracts produced dose-dependent relaxation of pre-constricted (phenylephrine and potassium chloride) rabbit aortas, and this response was atropine and calcium-channel dependent.^[51]

Makoy (*Solanum nigrum*): The extract of *Solanum nigrum* possesses significant nephroprotective activity.

Nephrotoxicity was induced in Wistar rats by intraperitoneal administration of gentamicin 100 mg/kg/day for eight days. Effect of concurrent administration of fresh juice extract of *Solanum nigrum* at a dose of 100 mg/kg/day given by oral route was determined using serum creatinine, AST, ALT, blood urea, ALP, ACP, reduced glutathione, catalase, glutathione peroxidase and protein as indicators of kidney damage. The fresh juice extract of *Solanum nigrum* significantly protected rat kidneys from gentamicin-induced nephrotoxicity by normalizing the alterations in biochemical parameters.^[52]

Ashwagandha (*Withania somnifera*)- Withania extract along with the antigen (SRBC) produced an enhancement in the circulating antibody titre and the number of plaque forming cells (PFC) in the spleen. Maximum number of PFC (985 PFC/106 spleen cells) was obtained on the fourth day. Withania extract inhibited delayed type hypersensitivity reaction in mice (Mantoux test). Administration of Withania extract also showed an enhancement in phagocytic activity of peritoneal macrophages (76.5 pigmented cells/200) when compared to control (31.5/200 cells) in mice. These results confirm the immunomodulatory activity of *W. somnifera* extract.^[53]

Pashanbheda (*Aerva lanta*)- The ethanolic extract of the entire plant of *Aerva lanata* was studied for its nephroprotective activity in cisplatin and gentamicin induced acute renal injury in albino rats of either sex. In the curative regimen, the extract at dose levels of 75, 150 and 300 mg/kg showed dose-dependent reduction in the

elevated blood urea and serum creatinine and normalized the histopathological changes in the cisplatin model. In the gentamicin model the rats in the preventive regimen also showed good response to the ethanol extract at 300 mg/kg. The results suggest that the ethanolic extract of *Aerva lanata* possesses marked nephroprotective activity with minimal toxicity and could offer a promising role in the treatment of acute renal failure caused by nephro-toxins like cisplatin and gentamicin.^[54]

Badriphal (*Hippophae rhamnoides*) One pilot study showed beneficial effect of the herbal preparation *Hippophae rhamnoides* as add on treatment in idiopathic nephrotic syndrome. Patients of NS were randomly divided into two groups A and B, each group comprising of 28 patients. Both groups were treated by standard treatment protocol for specific histological type. In group B standard treatment plus *Hippophae rhamnoides* 350 mg twice a day was given for 12 weeks as add on treatment. Patients were followed up every two weeks initially and then once in four weeks up to 12 weeks. At the end of 3 month patients showed improvement in the symptoms of edema, anorexia, oliguria in the herbal group. The urinary estimation of protein showed significant decrease in Group B with elevation of S. albumin levels. The inflammatory cytokines had showed significant decrease at the end of 3 month. The study concluded the beneficial role of *Hippophae rhamnoides* as add on therapy in difficult idiopathic nephrotic syndrome patients.^[55]

Table 2: Various action of drugs in Prevention and Management of Kidney Diseases

S.No.	Mechanism of Action	Herbal Drug
1.	Diuretic activity	<i>Saunf (Trigonellafoenum-graecum)</i> ¹¹ <i>Kokilaksha (Hygrophilaspinoso)</i> ¹² <i>Devadar (Cedrusdeodara)</i> ¹³ <i>Mulak (Raphanussativus)</i> ¹⁵ <i>Guduchi (Tinospora cordifolia)</i> ¹⁷ <i>Haridra (Curcuma longa)</i> ¹⁸ <i>Gokshura (Tribulus terrestris)</i> ^{20 21}
2.	Antioxidant activity	<i>Kali musli (Curculigoorchioides)</i> ¹⁴ <i>Saunf (Trigonellafoenum-graecum)</i> ¹¹ <i>shirish (Albezzia lebbek)</i> ²² <i>Amalaki (Phyllanthus amblica)</i> ^{25 26} <i>Haritaki (Terminalia chebula)</i> ²⁷ <i>Punarnava (Boerhaavia diffusa)</i> ²⁸ <i>Varuna (Crataeva nurvala)</i> ³¹ <i>Barley (Hordeum vulgare)</i> ³² <i>Orange (Citrus sinensis)</i> ³⁴ <i>Haridra (Curcuma longa)</i> ¹⁹ <i>Shunti (Zingiber officinale)</i> ⁴² <i>Corn silk (Stigma maydis)</i> ⁴⁵ <i>Papaya (Carica papaya Linn.)</i> ⁴⁷ <i>Dhanyaka (Coriandum sativum)</i> ⁵⁰
3.	Nephroprotective against drug induced renal injury (Prophylactic / Management)	<i>Amalaki (Phyllanthus amblica)</i> ²⁴ <i>Punarnava (Boerhaavia diffusa)</i> ³⁰ <i>Varuna (Crataeva nurvala)</i> ³¹ <i>Pashanbheda (Aerva lanta)</i> ³⁵ <i>Ashwagandha (Withania somnifera)</i> ³⁶ <i>Haridra (Curcuma longa)</i> ¹⁸

		<i>Shigru (Moringa Oleifera)</i> ³⁷ <i>Manjistha (Rubia cordifolia)</i> ³⁸ <i>Brihat Gokshura (Pedalium murex)</i> ³⁹ <i>Sahadevi (Vernonia cinerea)</i> ⁴⁰ <i>Shunti (Zingiber officinale)</i> ⁴¹ <i>Makoy (Solanum nigrum)</i> ⁴³ <i>Sariva (Hemidescus indicus)</i> ⁴⁴ <i>Revand Chini (Rheum emodi)</i> ⁴⁶ <i>Kasni (Cichorium intybus)</i> ⁴⁹ <i>Pashanbheda (Aerva lanta)</i> ⁵⁴
4.	UTI	<i>Shigru (Moringa Oleifera)</i>
5.	Atiinflammatory	<i>Haridra (Curcuma longa)</i> ¹⁹ <i>Amalaki (Phyllanthus ambllica)</i> ²³ <i>Barley (Hordeum vulgare)</i> ³³ <i>Badriphal (Hippophae rhamnoides)</i> ⁵⁵
6.	Immunomodulator	<i>Ashwagandha (Withania somnifera)</i> ⁵³ All nephroprotective and antioxidant, antioxidant and anti-inflammatory drugs can be included in this group.
7.	Cytoprotective	<i>Varuna (Crataeva nurvala)</i> ³¹
8.	reduces elevated blood urea & Serum Creatinine	<i>Punarnava (Boeharavia diffusa)</i> ²⁹ <i>Haritaki (Terminalia chebula)</i> ²⁸ <i>Makoy (Solanum nigrum)</i> ⁵²
9.	reducing renal hypertention	<i>Gokshura (Tribulus terrestris)</i> ²¹ <i>Papaya (Carica papaya)</i> ⁴⁸ <i>Dhanyaka (Coriandum sativum)</i> ⁵¹
10.	reduces oxidative stress	<i>Punarnava (Boeharavia diffusa)</i> ²⁹ <i>Guduchi (Tinospora cordifolia)</i> ¹⁷ <i>Haridra (Curcuma longa)</i> ¹⁹ <i>Shunti (Zingiber officinale)</i> ⁴²
11.	Antimicrobial	<i>Guduchi (Tinospora cordifolia)</i> ¹⁷

CONCLUSION

In conclusion, From this study, it is clear that the medicinal plants play a prominent role against various diseases. A variety of medicinal plants and plants extracts have been reported for its significant role in kidney disease. The activity of these drug is probably due to the nephroprotective, cytoprotective, immunomodulator, antioxidant, anti-inflammatory, reduces oxidative stress, renal hypertention and various toxin present in blood like urea, creatinine etc so have good potentials for use in kidney damage. Thus India traditional medicine very broad range of drugs which can be used in kidney diseases by their diversity to treat the disease and to rejuvenate the normal function of kidney. So it is recommended that further studies should be done to know the various aspect and mechanism of drugs.

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