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# A REVIEW ON VARIOUS MEDICINAL PLANTS WITH FOR NEPHROPROTECTIVE ACTIVITY

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## ABSTRACT

Nephrotoxicity is a poisonous effect of some substances, both toxic chemicals and medication, on the kidneys. There are various forms of toxicity. Nephrotoxicity should not be confused with the fact that some medications have a predominantly renal excretion and need their dose adjusted for the decreased renal function (e.g. heparin). A large number of medicinal plants, natural products and dietary components have been evaluated as potential nephroprotective agents. This article presents a review on some reported antidiabetic medicinal plants. Medicinal plants may serve as a vital source of potentially useful new compounds for the development of effective therapy to combat a variety of kidney problems. Many herbs have been proven to be effectual as nephroprotective agents while many more are claimed to be nephroprotective but there is lack of any such scientific evidence to support such claims. Developing a satisfactory herbal therapy to treat severe renal disorders requires systematic investigation of properties like acute renal failure, nephritic syndrome and chronic interstitial nephritis. Herbal medicines possess curative properties due to the presence of their chemical components. The present review is aimed to elucidate the list of nephroprotective medicinal plants, which are scientifically proved in treating renal disorders.

**KEYWORDS:** Nephrotoxicity, Medicinal Plants, Kidneys, Nephroprotective Plants, Renal Disorders.

## INTRODUCTION

About 80 % of the world population depends on traditional medicine for their primary health care needs. Exploration of traditional medicine is a mysteriously interesting yet, scientifically significant and economically important task of ethnobotanists. Nephrotoxicity is one of the most common kidney problems and occurs when body is exposed to a drug or toxin. A number of therapeutic agents can adversely affect the kidney resulting in acute renal failure, chronic interstitial nephritis and nephritic syndrome because there is an increasing number of potent therapeutic drugs like aminoglycoside antibiotics, NSAID's, chemother apeutic agents have been added to the therapeutic arsenal in recent years (Hoitsma et al., 1991).

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Exposure to chemical reagents like ethylene glycol, carbon tetrachloride, sodium oxalate and heavy metals such as lead, mercury, cadmium and arsenic also induces nephrotoxicity. Prompt recognition of the disease and cessation of responsible drugs are usually the only necessary therapy (Paller. 1990). Nephroprotective agents are the substances which possess protective activity against Nephrotoxicity. Medicinal plants have curative properties due to the presence of various complex chemical substances. Early literatures have prescribed various herbs for the cure of renal disorders (http:// farmacists.blogspot.com). Co-use of various medicinal plants possessing nephroprotective activity along with different nephrotoxic agents which may attenuate its toxicity.

The term renal failure primarily denotes failure of the excretory function of kidney, leading to retention of nitrogenous waste products of metabolism in the blood (Gourley. 2000). In addition to this, there is a failure of regulation of fluid and electrolyte balance along with endocrine dysfunction. The renal failure is fundamentally categorized into acute and chronic renal failure (Barry et al., 2000).

Nephrotoxicity is one of the most common kidney problems and occurs when body is exposed to a drug or toxin. 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. A number of therapeutic agents can adversely affect the kidney resulting in acute renal failure, chronic intestinal nephritis and nephritic syndrome because increasing number of potent therapeutic drugs like aminoglycoside antibiotics, chemotherapeutic agents and NSAIDs have been added to the therapeutic arsenal in recent years. Exposure to chemical reagents like ethylene glycol, carbon tetra chloride, sodium oxalate and heavy metals like lead, mercury, arsenic and cadmium also induces nephrotoxicity (Pydi. 2011; Bharti et al., 2012; Yogesh et al., 2011; Vadivukkarasi and Sudha. 2011; Murthy et al., 2011). Many plants have been used for the treatment of kidney failure in traditional system of medicine throughout the world. Indeed along with the dietary measures, plant preparation formed the basis of the treatment of the disease until the introduction of allopathic medicine.Traditional knowledge 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. Therefore, search of nephroprotective herbs from medicinal plants has become important and need of the day.

Therefore article shows a review on some reported antidiabetic medicinal plants (with their botanical name,Family and part used) (Shelkea et al., 2011; Shanmukha et al., 2010; Chand et al., 2009; Sarumathy et al., 2011; Priyadarsini et al., 2012; Hajiz et al., 2012; Zoobi and Ali. 2012; Sahoo et al., 2012; Kalaiselvan et al., 2010; Cordeiro and Kaliwal. 2011; Mehul et al., 2012; Swathi et al., 2011; Nitin et al., 2012; Dheeraj et al., 2010; Kannappan et al., 2010; Geo and Baskaran. 2011; Palani et al., 2010; Chanchal et al., 2006; Narendra and Ameeta. 2012; Sudhavani et al., 2010; Okwosa et al., 2009; Pratibha et al., 2009; Guanghua et al., 2012; Jain and Singhai. 2010; Gutierrez et al., 2010; Qazi Zaid et al., 2012; Hussian et al., 2012; Saumya et al., 2011).

Acute renal failure (ARF) refers to the sudden and usually reversible loss of renal function which develops over a period of days or weeks. There are many causes for acute renal failure which mainly includes acute tubular necrosis that commonly accounts for 85% of incidence. Mostly acute tubular necrosis occurs either due to ischemia or toxins. The toxins may be

 

exogenous or endogenous. The exogenous agents are radio contrast agents, cyclosporine, antibiotics, chemotherapeutic agents, organic solvents, acetaminophen and illegal abortifacients (Barry et al., 2000). Chronic renal failure (CRF) is an irreversible deterioration in the renal function which classically develops over a period of years, leading to loss of excretory metabolic and endocrine functions. Various causes of renal failure has been recognized like hypertension, diabetes mellitus, antineoplastic agents like cyclophosphamide, vincristin and cisplatin etc (Gourley. 2000).

## AGENTS WHICH CAUSES NEPHROTOXICITY

Drugs, diagnostic agents & chemical are well known to be nephrotoxic. The following are some of the important nephrotoxic agents (Schrier and Gottschalk. 1993).

a) **Heavy metal**: Mercury, arsenic, lead, bismuth
b) **Antineoplastic agents**
   - **Alkylating agents:** Cisplatin, cyclophosphamide
   - **Nitrosoureas:** Streptozotocin, Carmustine, Lomustine & Semustine
   - **Antimetabolites:** High dose Methotrexate, Cytosine Arabinose, high dose 6-thioguanine, 5-flurouracil
   - **Antitumor antibiotics:** Mitomycin, Mithramycin, Doxorubicin
   - **Biologic agents:** Recombinant leukocyte and interferon
c) **Antimicrobial agents:** Tetracycline, Acyclovir, Pentamidine, Sulphadiazine, Trimethoprin, Rifampicin, Amphotericin B
d) **Aminoglycosides:** Gentamycin, Amikacin, Kanamycin, Streptomycin
e) **Miscellaneous**
   - **Radiocontrast agents:** Non-steroidal anti-inflammatory agents (NSAID's): Ibuprofen, Indomethacin, Aspirin etc.

# NEPHROPATHIES CAUSED DUE TO DIFFERENT TOXIC MECHANISMS

## CISPLATIN TOXICITY

Cisplatin is a potent antitumor drug, but its clinical use is limited due to renal toxicity. Cisplatin decreases antioxidants and anti oxidant enzymes leading to enhanced generation of reactive oxygen metabolites and lipid peroxidation (Sadzuka et al., 1992). It is reported that many Indian medicinal plants show beneficial effects against renal injury (Ali and AlMoundhri. 2006). An early report indicated that nephrotoxicity might occur in as many as 50 to 75% of patients receiving this drug, and is dose limiting. It is used intensively in man, being effective in ovarian & bladder carcinoma, neuroblastoma, head and neck carcinoma, and lymphoma as well as thyroid endometrial neoplasm. However, the most significant activity is observed in testicular cancer. The clinical use of cisplatin is often complicated by nephrotoxicity, ototoxicity, gastrointestinal disturbances like nausea, vomiting and myelosuppression. Early clinical trials of cisplatin in cancer patients showed a striking incidence of persistent azotaemia and acute renal failure. Experimental studies have shown that there is an abrupt fall in the effective renal plasma flow within 3 hrs of the i.p. dose of cisplatin. It is known to be filtered by the glomeruli and concentrated in the glomerular filtrate from which it is activated in the presence of a low intra cellular chloride concentration. The low intracellular concentration of chloride facilitates the displacement of chloride by the water molecule yielding a positively charged, hydrated and hydroxylated complex. Hydration of cisplatin induces formation of monochloro monoaquodiamino platin or diaquo diammineplatin. These agents alkylate the purine and pyrimidine bases of nuclear material. Renal damage is seen in proximal

 

tubular S3 portion, the distal tubule and collecting duct. Other proposed explanation of the nephrotoxicity of cisplatin include the possibility that it include generate reactive metabolites that bind covalently to tissue macromolecules. The nephrotoxic effects might also be due to sulphydryl binding of heavy metal. A reduction in sulphydryl groups in the rat renal cortex has been demonstrated; this occurred before any significant change in renal function could be detected, suggesting that this biochemical change may be a primary event. Cell fractionations have shown that the greatest decline of sulphydryl groups occurs in the mitochondrial & cytosol fractions; these also had the highest concentrations of platinum. A study found that cisplatin induced proximal tubule injury could be ameliorated by the administration of hydroxyl radical scavengers. In these studies cisplatin (5mg/kg BW) caused lipid peroxidation. The hydroxyl radical scavenger prevented acute renal failure by altering tubule damage & enhancing the regenerative response of damaged tubule cells protection from cisplatin toxicity has generally focused on providing free radical scavengers.

## ACETAMINOPHEN TOXICITY

Acetaminophen is also known as paracetamol (Yapar et al., 2007). It is a widely used analgesic and antipyretic drug that is safely employed for a wider range of treatments (Nelson. 1995). Overdose of acetaminophen in humans is fairly common and is often associated with hepatic (Boelsterli. 1993; Holtzman. 1995) and renal damage (Trumper et al., 1998; Ghosh and Sil. 2007; Gulnaz et al., 2010). Although nephrotoxicity is less common than hepatotoxicity in acetaminophen overdose, renal tubular damage and acute renal failure can occur even in the absence of liver injury (Jones and Vale. 1993; Eguia and Materson. 1977) and can even lead to death in humans and experimental animals (Ray et al., 1996; Webster et al., 1996). Studies are going on throughout the world in search of protective molecules that would provide maximum protection to the liver, kidney as well as other organs and practically very little or no side effects would be exerted during their function in the body (Montilla et al., 2005; Mansour et al., 2006). A number of herbs are traditionally used in different countries during in response to drug or toxin induced hepatic and renal disorders (El-Beshbishy. 2005). There are three pathways for acetaminophen metabolism which includes conjugation with sulfate, glucoronide and metabolism by cytochrome p450 oxidase enzyme system (Slitt et al., 2005; Gamel el-din et al., 2003). 90% of ingested dose is metabolized through glucoronidation and sulfation pathway and 5% through cytochrome p450 oxidase enzyme system32-34. Metabolism by cytochrome p450 enzyme system produces a metabolite, *N*-acetyl-*p*-benzoquinone imine (NAPQI) which is toxic to liver and kidney. In therapeutic dose, this is rendered ineffective by reduced glutathione, an antioxidant compound in the liver and NAPQI-reduced glutathione is excreted by kidney. In acetaminophen overdose, sulfation and glucoronidation pathways become saturated. The amount and rate of formation of NAPQI is greatly increased, depleting body's reduced glutathione stores and outstripping its capability to make new glutathione. NAPQI then binds covalently with cells causing their death, resulting in liver and kidney dysfunction. Indeed several biological compounds with antioxidant properties proved effective in protecting the kidneys against deleterious effects of acetaminophen overdose (Presscott. 2005; Mugford and Tarloff. 1997; Melo et al., 2006; Liebert et al., 2005).

## GENTAMICIN TOXICITY

Aminoglycoside antibiotics have been widely used for gram-negative bacterial infections. However, their nephrotoxicity and ototoxicity

 

are the major limitations in clinical use. Among several aminoglycoside antibiotics, the grade of nephrotoxicity has been reported to be in the following order as, neomycin > gentamicin > tobramycin (Hu et al., 1996). Gentamycin Nephrotoxicity occurs in about 15-30% of treated subjects, is manifested clinically as non-oliguric renal failure, with a slow rise in serum creatinine and hypoosmolar urinary output developing after several days of treatment (Abdel-Zaher et al., 2008). Gentamicin is filtered through glomeruli into tubular urine that binds with anionic phospholipids, such as phosphatidylinositol or phospholipdylserine, in brush border membrane of proximal tubular cells reabsorbed actively via pinocytosis process into tubular cells, taken up by lysosomes and thereafter produces phospholipidosis (Hu et al., 1996). The drug enters into the cells by adsorptive/receptor mediated endocytosis after binding to acidic phospholipids and megalin and is found essentially in lysosomes. Animals treated with low, therapeutically relevant doses of aminoglycosides show both lysosomal phospholipidosis and apoptosis in proximal tubular cells (Suzuki et al., 1995). The following are some of the medicinal plants for review which possess nephroprotective activity.

Demand for medicinal plants is increasing in both developing and developed countries. Research on medicinal plants is one of the leading areas of research globally. However, there is a need to pay closer attention to the issue of bioactivity-safety evaluation and conservation of medicinal plants. Kidney failure is one of the most common diseases in India. The world health organization recognizes four major groups of renal failure according to the predominant involvement of corresponding morphologic component. i) Glomeruler diseases, ii) Tubular diseases, iii) Interstitial diseases and iv) Vascular diseases. Also two major stages *viz*. a) Acute renal failure-is a syndrome characterized by rapid onset of renal dysfunction, chiefly oliguria or anuria, and sudden increase in metabolic waste-product in the blood and secondly b) Chronic renal failure-is a syndrome characterized by progressive and irreversible deterioration of renal function due to slow destruction of renal parenchyma eventually terminating in death. Many plants have been used for the treatment of kidney failure in traditional system of medicine throughout the world. Indeed along with dietary measures, plant preparation formed the basis of the treatment of the disease until the introduction of allopathic medicine. Ethnomedicinal plants can be used to help forestall the need for dialysis by treating the causes and effect of renal failure, as well as reducing the many adverse effect of dialysis (Yarnell et al, 2007) though; there are few chemical agents to treat acute renal failure. Studies reveal that synthetic nephroprotective agents have adverse effect besides reduce nephrotoxicity, Various environmental toxicant and clinically useful drugs, acetaminophen and gentamicin, can cause severe organ toxicities through the metabolic activation to highly reactive free radical (Adeneye et al, 2008) Right from its beginning, the documentation of traditional knowledge, especially medicinal uses of plants, has provided many important drugs of modern day. The herbalist / local vaidyas still practice herbal medicines. Several herbal drugs act as good non-specific cytoprotective. In view of this background, it is thought worthwhile to evaluate the indigenous plants which could be useful as adjuvant as nephroprotective. This helps to decrease the potential nephrotoxicity of drugs like gentamicin, cisplatin, cyclosporine, Carbon tetrachloride etc. (Qarawi et al, 2008; Khan et al, 2009). Further it was conceptualized that such native plants would be useful, at least as adjuvant in the treatment of different kind of degenerative disease of kidney (Meena et al, 2009). Such type of observations also recorded in own laboratory using herbal formulation. The

 

knowledge of these medicines is age old. The use of herbs is the cheapest way for cure of various health disorders. (Bhattacharjee, 1998; Kirtikar and Basu, 1995; Khare, 2007). This review attempts to portray the discovery and development of medicine from galenical to genomical, with a focus on the potential and role of medicinal plants. Ayurveda is a traditional Indian medicinal system being practiced for thousands of years (Chopra et al, 1994) Ethnobotanical studies are often significant in revealing locally important plant species especially for the discovery of crude drug (Jain et al, 1991). Considerable research on pharmacognosy, chemistry, pharmacology and clinical therapeutics has been carried out on native medicinal plans. Traditional knowledge driven drug development can follow a reverse pharmacology path and reduce time and cost of development. In Indian system of medicin several herbal remedies has been tried for the treatment of Kidney failure since the time of Charka and Sushruta. New approaches to improve and accelerate the joint drug discovery and development process are expected to take place mainly from innovation in drug target elucidation and lead structure discovery. (Pushpagandan and Kumar, 2005) Traditional knowledge 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**.** Therefore, search of nephroprotective herbs from medicinal plants has become important and need of the day (Patil, 2003). Periodical surveys were made for search of new traditional herbal medicines in village of khandesh region local traditional healers having practical knowledge of plant in medicine were interviewed in Nundurbar, Dhule and Jalgaon district. These district are inhabited by Bhills, Garits, kokanis, mavschis, valvis, pawras, tribs. Regular visits were planned during the period of 2007-2009. The information was collected from local traditional healers and abroginal people of these districts through intensive interviews according to method suggested by (Chopda and Mahajan et al, 2009) The gathered data was verified by Ethenomedicinal plants uses as nephroprotective care in khandesh region of Maharashtra. (Gupta et al, 2004 and Tayade and Patil, 2006).

**Table 1a.List of Nephroprotective plants**

| **Botanical Name** | | **Family** | **Part used** | **Chemical constituents** | **Screening method** | **References** |
|---|---|---|---|---|---|---|
| 1 | *Aerva lanata* | Rutaceae | Whole plant | Botulin,β-sitosterol, Amyrin, Hentriacontane, Campesterol, Stigma sterol, Kaempferol, Propionic acid, β-carboline-I, Aervoside and Aervolanine. | Gentamycin induced | Paller et.al, 1990 |
| 2 | *Crataeva nurvula* | capparidaceae | Fruit | Kaemferol-3-O-a-D-glucoside, Quercitin-3-O-a-D-glucoside, Flavanoids, Glucosinolates, Steroids, Lupeol and Tannins. | Gentamycin induced | Kore et.al, 2011 |

 

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| 3 | *Orthosiphon stamineus* | Laminaceae | Whole plant | Flavanoids, Phenols, Carbohydrates, Steroids, Tannins, Glycosides, Terpins and Saponins | Gentamycin induced | Kannapan et.al,201041 |
| 4 | *Strychnos potatorum* | Loganiaceae | Seed | Flavanoids, Phenols, Saponins, Alkaloids, Steroids, Tannins, Glycosides, and Lignins. | Gentamycin induced | Ruby Varghese et.al, 2011 |
| 5 | *Aerva javanica* | Amaranthaceae | Fresh roots | Isoquercetin, 5 methylmellein, 2-hydroxy -3-O-β-primeveroside naphthalene-1,4-dione, Apigenin7-Oglucoronide and Kaempferol | Cisplatin induced | Vinit movaliya et.al, 2011 |
| 6. | *Carica papaya* | Caricaceae | Seed | Flavanoids, Phenols, Alkaloids, Protein, Sterols, Terpenoids, Carbohydrates, Steroids, Tannins, Glycosides, Terpins and Saponins. | Cisplatin induced | Subal debnath et.al, 2010 |
| 7. | *Ficus religiosa L* | Moraceae | Latex | Flavonoids, Amino acids and Tannins. | Cisplatin induced | Yogesh chand yadav et.al, 2011 |
| 8. | *Pedalium murex Linn* | Pedaliaceae | Dried fruits | Flavanoids, Flavones, Alkaloids, Triterpenoids, Carbohydrates, Glycosides and Saponins. | Cisplatin induced | Shelke et.al, 2009 |
| 9. | *Vernonia cinerea* | Compositae | Aerial parts | Triterpenoids like α-amyrin, β-amyrin and lupeol. | Cisplatin induced | Sreedevi et.al, 2011 |
| 10. | *Acorus calamus* | Araceae | Aerial parts | Monoterpene, Sesquiterpene, Phenyl propanoid, Flavonoids, Quinone and basarone. | Acetaminophen induced | Palani et.al, 2010 |
| 11. | *Boerhaavia diffusa* | Nyctaginaceae | Root | Flavonoids, Alkaloids, Steroids, Triterpenoids, Lipids, Lignins, carbohydrates, Proteins and Glycoproteins. | Acetaminophen induced | Surendra et.al, 2011 |
| 12. | *Indigofera* | Fabaceae | Whole | Flavonoids, Phenolic | Acetaminop | Palani et.al, |

 

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| | *barberi L* | | plant | acid and sterols. | hen induced | 2008 |
| 13. | *Pimpinella tirupatiensis* | Apiaceae | Whole plant | Alkaloids, Flavonoids, Flavones, Volatile oils, β-Bisaboline, Δ-3-Carene, Cis-Carveol, Enemol, Δ-Carveol and Methylgeranate. | Acetaminophen induced | Palani et.al, 2009 |
| 14. | *Curcuma longa* | Zingeberaceae | Rhizome | Curcumin, Turmeric oil, Terpenoids, Curcumin (Terpene), Starch and Albumnoids. | Cadmium induced | Eduardo Molina-Jijon et.al, 2011 |
| 15. | *Drynaria fortune* | Polypodiaceae | Whole plant | Arsenic, Ca2+, Cu2+, Glucose, Iron, Mg, Mn, Hg, Naringin, K+, Na+, Starch and Zinc. | Silver chloride induced | Kore et.al, 2011 |
| 16. | *Eruca sativa* | Crassulaceae | Seeds | Flavanoids | Mercuric chloride induced | Sarwar Alam et.al, 2007 |
| 17. | *Moringa oleifera* | Moringaceae | Seeds | Vitamin A, Nicotinic acid, Ascorbic acid, Vitamin B, Fatty acid, Glucose, Sucrose, Citric acid, Malic acid, Succinic acid, Fumaric acid and Oxalic acid. | Fluoride induced | Ranjan et.al, 2009 |
| 18. | *Tamarindus indica* | Caesalpinaceae | Fruit pulp | Polysaccharides, Balsamine, Catechin, Nasturtium, Tamarin, Phosphatidic acid, Phosphatidic choline, Ethanollamine, Serine, Inositol, Alkaloid, Citric acid, Tartaric acid and Pottasiumbitartrate. | Fluoride induced | Ranjan et.al, 2009 |
| 19. | *Tectona grandis* | Verbanaceae | Bark | Lapachol, Dehydro-α-lapachone, Methyl quinizarin and Squalene. | Alloxan induced | Ghasias et. al, 2010 |
| 20. | *Ginkgo biloba* | Ginkgoaceae | Whole plant | Flavonoids, Bilobalide, GingkolideA, Gingkolide B and | Streptozotocin induced | Welta et.al, 2007 |

 

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| | | | | Gingkolide C and Biflanoide. | | |
| 21. | *Abutilon indicum* | Malvaceae | Whole plant | Saponins, Flavonoids and Tannins. | Gentamicin induced | Khore et.al, 2011 |
| 22. | *Euphorbia neriifolia* | Euphorbiaceae | Leaves | Saponins, Flavonoids and Tannins | N-nitroso dimethyl amine induced | Pracheta et.al, 2011 |
| 23. | *Rubia cardifolia Linn* | Rubiaceae | Root | Purpurin, Manjistin, Garancin,Purpuroxanthin, Resin, Glucose, Sucrose, Triterpenes, Lucidine, Anthroquinine, Fatty acids and Gum. | Ethylene glycol induced | Divakar et. al, 2010 |
| 24. | *Punicagranatum L* | Puniaceae | Fruit peel | Ellagic acid, Ellagitannins and gallic acid. | Ferric nitrilo tri acetate induced | Ahmed et al, 2010 |

**Table 1b.Some Indigenous plants to used against Kidney disorders**

| S. No. | Name of plants | Family | V. Name | Main Active Principle |
|---|---|---|---|---|
| 1. | *Abelmoschus esculentus L* | Malvaceae | Bhendi | Carotene, folic acid, thiamine riboflavin, tocopherol palmitic acid |
| 2. | *Abrus precatorius L* | Leguminosae | Gunja | Glucoside,Alkaloid, |
| 3. | *Abutilon indicum L* | Malvaceae | Atibalaa | Asparagines,Mucilage,Tannin, alkaloids |
| 4. | *Acacia arabica(Willd)* | Leguminosae | Babul | Tannin,Flavonoid |
| 5. | *Acacia catechu L* | Mimosaceae | Khair | Flavonoid,,Tannin |
| 6. | *Acacia sinuate( Lour)Merrill* | Mimosaceae | Cikakai | Saponin,Flavonoid,Tannin |
| 7. | *Achilla millefolium L* | Compositae | Gandana | Alkaloid,Essential oil |
| 8. | *Achyranthes aspera L.* | Amaranthaceae | Aghada | Alkaloids,saponin,Tannin Oil |
| 9. | *Adiantum Lunulatum Burm* | Polypodiaceae | Hansraj | Flavonoids,terpenoids,Tannin,Volatile oil |
| 10. | *Aerva lanata L Juss* | Amaranthaceae | Kupuri madhuri | Amyrin, campensterol, β-sitosterols, flavonoides, glycoside |
| 11. | *Alangium salvifolium Wang* | Alanglaceae | Ankol | Alkaloids,AkolineLamarkine, |
| 12. | *Allium cepa L.* | Liliaceae | Onian | Essential oil orgnic sulphide Flavonoid, phenolic acid |
| 13. | *Amaranthus spinosus L.* | Amaranthaceae | Kateli-chaulai | Alkanes, Quinoline,sterols |
| 14. | *Anogeissus latifolia( Roxb)* | Combretaceae | Dhavara | Tannins,calcium,gum,Qurecetin |
| 15. | *Anona Squamosa L* | Annonaceae | Custard apple | Alkaloid Aminoacids, camphor, anonaine |

 

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| 16. | *Apium graveolens L.* | Umbelliferae | Ajmoda | Volatile oil,Flavonoids,Alkaloid |
| 17. | *Arachis hypogaea L* | Fabaceae | Mung-phali | Vit e, Flavonoid, Tannins |
| 18. | *Arctium lappa L.* | Compositae | Great Burdock | Flavonoid Hexa-saccharide, tannin volatile oil |
| 19. | *Asclepias syriaca L.* | Asclepiadaceae | Mohari | Glucol, asclepiadin |
| 20. | *Asparagus racemosus Willd* | Liliaceae | Shatavari | Oil,saponin |
| 21. | *Atropa belladona L.* | Solanaceae | Belladona | Alkaloid,Tanin,starch, |
| 22. | *Azadirachta indica L* | Meliaceae | Nimb | Alkaloid, steroid, a.acid Azardin, Resin, tannine, fixed oils |
| 23. | *Bacopa monnieri L* | Scrophulariaceae | Brahmmi, . | Essential oil,Alkaloid |
| 24. | *Balanites roxburghii L* | Balanitaceae | Hingol | Steroidal Saponin,Amino acid |
| 25. | *Baliospermum montanum* Willd | Euphorbiaceae | Danti | Phorbol esters, Terpenoid, Flavonoids, hydrocarbon, sitoserol, D-glucoside |
| 26. | *Bambusa bamboo Von* | Arundinacae | Bamboo | Cholin,betain,Nuclease,Urease, |
| 27. | *Bambusa nutans L* | Arundinacea | Bamboo | Cholin,betain,Nuclease,Urease, |
| 28. | *Barleria prionitis Linn.* | Aceanthaceae | Kate-Koranti | Essential oil,Flavonoid Glycoside, β-sitosterol |
| 29. | *Basella alba L* | Basellaceae | Indian spinach | Iodine,fiuorine,carotenoidsFlavonoid |
| 30. | *Benincasa hispida (Thunb)Cogn* | Cucurbitaceae | White gourd | Glucoge,mannitolβ-sitosterol,protene |
| 31. | *Boerhavia diffusa L.* | Nyctaginaceae | Punarnava | Flavonoid,Alkaloids,triacontanol,hentriacontane,β.sitosterol |
| 32. | *Boswellia serrata roxb* | Burseraceae | Dhupali, Salai | Tanins,pentosans,lignin,holocellulose,β-sitosterol |
| 33. | *Brassica oleracea L* | Brasscaceae | Cabbage | Essentinl, aminoacid |
| 34. | *Butea monosperma Lam* | Fabaceae | Palash | GlucosideButine,proteolytic lipolytic enzyme,Flavonoid |
| 35. | *Cajanus cajan L millsp* | Fabaceae | Tuvar | Amino acid,galactosid |
| 36. | *Carica papaya L.* | Caricaceae | Papaya | Alkaloid, papain enzymes. |
| 37. | *Cardiospermum halicacabum L.* | Sapindaceae | Kanphuti | Alkaloid, β-sitostero.l |
| 38. | *Cassia absus L.* | Caesalpiniaceae | Ran Kulith | Alkaloid, Sitosterol, Glucoside. |
| 39. | *Cassia fistula L.* | Caesalpiniaceae | Bahava | glycoside,Tannin,Flavonoid. |
| 40. | *Chelidonium jajus L.* | Papaveraceae | Celandine | Alkaloids, Flavonoids |
| 41. | *Cocos nucitera L* | Arecaceae | Coconut | Saccharose sorbitol alcohol,ketones |
| 42. | *Commiphora mukul* Engl | Burseraceae | Guggal | Guggulsterone, Flavonoid. |
| 43. | *Cordia dichotoma Forst* | Boraginaceae | Bhoker | Alkaloid,Tannin |
| 44. | *Curculigo orchioidesGaertn* | Amaryllidaceae | Kalimusli | Saponine,curculigo,phenolicglycoside |
| 45. | *Cynodon dactylon Pers* | Gramineae | Durva | β-ionone,2-propionic4-hydroxybenzoic |
| 46. | *Cyperus rotundus L* | Cyperaceae | Nagermotha | Essentialoil,cyperene,cyperol,starc |

 

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| | | | | h β-sitosterol |
| 47. | *Datura metal L* | Solanaceae | Datura | Alkaloid,scopolamine,hyposcymine, atropin,vitC |
| 48. | *Daucus carota L* | Umbelliferae | Carrot | Oil, carotol essential oil,Flavones |
| 49. | *Demostachya bipinnata L* | Compositae | Kush | Alkaloid,Terpenoid |
| 50. | *Desmodium gangeticum L* | Fabaceae | Salpan | Alkaloids |
| 51. | *Digitalis Purpurea L* | Scrophulariaceae | Hrutpatri | Glycosides,flavonoids,saponin |
| 52. | *Dolichos biflorus L* | Leguminosae | Kulith | Urease,lectin carbohydrate |
| 53. | *Elettaria cardamomum Maton.* | Zingiberaceae | Chhoti Elaichi | Palmitic acid |
| 54. | *Ficus religiosa L* | Moraceae | Piple | Arabinose,mannose,glucose β-sitosterol D-glucoside |
| 55. | *Foeniculum vulgareMill* | Apiaceae | Saunf | Oil, Methyl Chavicol, Limonene Essential oil |
| 56. | *Gossypium arboretum L.* | Malvaceae | Cotton | Betaine,choline,Salicylic acid. |
| 57. | *Gymnema sylvestrer(Retz)R.Br* | Asclepiadaceae | Gudmar | Saponine,I-V,gymnemic acid |
| 58. | *Haldina cordifolia(Roxb)* | Rubiaceae | Haldu | Oleoresin,essential oil,cellulose,βsitosterol |
| 59. | *Helianthus annus L.* | Compositae | Sunflower | Albumin.globulin,glutelin, βsitosterol |
| 60. | *Hemidesmus indicus L.* | Asclepiadaceae | Anant mule | Essential oil,Steroid,saponin,resine tannine |
| 61. | *Hibiscus sabdariffa L.* | Malvaceae | China Rose | Organic acid anthocyanin vitamin C |
| 62. | *Holarrhena antidysentrica L.* | Apocynaceae | Kala-Kuda | Alkaloids, tannin, Triterpene, |
| 63. | *Humulus lupulns L.* | Cannabidaceae | Hop | Volatileoil,polyphenolic,Tannin Aspargin |
| 64. | *Hygrophila auriculata K.Schum.* | Acanthaceae | Neermali | Fattyoil,alkaloid,calcium,phosphate , K, CL |
| 65. | *Jasmium grandiflorum L.* | Oleaceae | Chameli | Alkaloid,Salicylicacid,essencial oil,Ascorbic acid Glucoside |
| 66. | *Lawsonia inermis L.* | Lythraceae | Mehandi | 2-hydroxy-1,4-naphthquinone Flavonoid, βsitosterol |
| 67. | *Leptadenia reticulataW.&A* | Asclepiadaceae | Jivanti | Stigma sterol,tocopherol |
| 68. | *Linum usitatissimum L.* | Linaceae | Aalsi | fixed oil protene wax,resin,sugar glycoside |
| 69. | *Mangiifera indica L.* | Anacardiaceae | Mango Plant | Flavonoid Phenolic acidVitamin ABCD |
| 70. | *Menta arvensis L.* | Labiatae | Podina | Essentialoil,carvones |
| 71. | *Mesua ferrea L.* | Guttiferae | Nagkesarah | Palmitic,stearic,oleic linoleic |
| 72. | *Michelia champaca L.* | Magnoliaceae | Champa | Essentialoil fatty oil |
| 73. | *Mimosa pudica L.* | Leguminosae | Lajalu | Alkaloids,Mimosine |

 

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|---|---|---|---|---|
| 74. | *Momordica dioica Roxb ex willd* | Cucurbitaceae | Jangali karelaa | Glycoside,saponin |
| 75. | *Moringa oleifera Lam* | Moringaceae | Drumstick tree | Carotene,nicotic acid,ascorbic acid,amino acid |
| 76. | *Mucana pruriens L.* | Leguminosae | Khajkuiri | ,Calcium,phosphorus,iron,sulphur,alkaloids |
| 77. | *Mucuna adans L* | Leguminosae | Khaj-Kuiri | Calcium,glucoside alkaloids βsitosterol |
| 78. | *Murraya Koenigii L* | Rutaceae | Karry patta | Oil,b-caryophyllene,b-gurjunene, b-Carbazol, Alkaloid |
| 79. | *Musa paradiciaea L* | Scistaminaceae | Banana | Albumin,globulin,glutelin,proteoses |
| 80. | *Nelumbium nucifera gaertn* | Nelumbonaceae | Lotus | Alkaloids,nuciferine,protene sugar, vitamin |
| 81. | *Nerium indicumMill* | Apocynaceae | Kaner | Glycoside Digitoxigenin |
| 82. | *Nyctanthus arboterresris L* | Oleaceae | Parijat | Oil,manitol,tannin, βsitosterol |
| 83. | *Ocimum basillicum L.* | Labiatae | Sweet Basil | Essentialoil,methylcinnamate,eugenol, alkaloid,Flavonoid |
| 84. | *Ocimum canum L* | Labiatae | Sathra | Essential oil,Eugenol, βsitosterol |
| 85. | *Ocimum Sanctum L* | Labiatae | Tulasi | Eugenol,methol,ether,carvacol |
| 86. | *Orchis latifolia L* | Orchidaceae | Salam | Volatile oil,loroglosin,Glucoside |
| 87. | *Orza sativa L* | Gramineae | Chawal | Alkaloid,orilineprotene fat carbohydrate |
| 88. | *Ougeinia oojeinensis (Roxb) Hochr* | Fabaceae | Dandan | Dimethoxy isoflavone homoferreiri |
| 89. | *Paederia foetida L* | Rubiaceae | Hirenwel | Essential oil, Alkaloids,foetida |
| 90. | *Pandanus odoratissimus L* | Pandanaceae | Ketek | Essential oil,MethyletherPhenylethyl alcohol |
| 91. | *Pedalium murex L* | Pedaliaceae | Bada gokhru | Alkaloid, fatty oil,resin |
| 92. | *Phaseolus mungo L* | Leguminoseae | Green gram | 2.8%ash,Oil |
| 93. | *Phyllanthus niruri L* | Euphorbiaceae | Bhui awala | Alkaloid,Flavonoids, Phyllanthin, hypophyiianthin |
| 94. | *Phyllanthus urinaria L* | Euphorbiaceae | Valaitisaunf, Muhuri | Alkaloid,Flavonoid-quercetin,astragalin, |
| 95. | *Phyllanthus reticulates Pair* | Euphorbiaceae | Jarmala | Tannic acid |
| 96. | *Pimpinella anisum L.* | Umbelliferae | Rajanigandha | Volatile oil,flavonoid,Sterol |
| 97. | *Piper nigrum L* | Pipereceae | Blak piper | Piperin, piredin alkaloid, chavicine essential,oil |
| 98. | *Saccharum officinarum L* | Poaceae | Suger cane | Phenol,Glycolicacid |
| 99. | *Santalum album L.* | Santalaeae | Safed Chandan | Santalbic acid,palmitic acid, olic acid |
| 100. | *Saraca indica L* | Leguminosae | Ashok tree | Tannin, catechol,sterol,glycocide |
| 101. | *Securinega leucopyrus Muell-Arg* | Euphorbiaceae | Hartto | Alkaloids, freetriterpens, steroids Tannin |
| 102. | *Solanum indicum L* | Solanaceae | Dorli | Alkaloid,enzymes |
| 103. | *Solanum surattense* | Solanaceae | Katali Kattay | Gluco |

 

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|---|---|---|---|---|
| | *burn* | | | alkaloid,solasodine,solasonine |
| 104. | *Solanumxantocarpu m schrad &Wendell* | Solanaceae | Kateringani | carpesterol,Glucoside,Alkaloid,sola nocarpine |
| 105. | *Solena amplexicaulis Lam* | Umbelliferae | Gomathi, Tawgaula | Alkaloid,Glycoside,Steroid |
| 106. | *Sorgham vulagare L* | Graminae | Jawar | Glucoside, Dhurin |
| 107. | *Sphaeranthus indicusL* | Compositae | Gorkhmundi | Alkaloid,sphaeranthine,essential oil |
| 108. | *Tamarindus indica L* | Caesalpiniacae | Imli | Tartaric acid,citricacid maleicacid flavonoid,glycosides |
| 109. | *Tectona grandis L* | Verbenaceae | Teak | Calcium,phosphate,silica ammonium mg |
| 110. | *Tephrosia purpurpa L* | Fabaceae | Sarphomka | Tephrosin,rotenone |
| 111. | *Terminalia chebula Retz* | Combrataceae | Hirda | Palmitic stearic oleic linoleic,Astrigent,tannic acid |
| 112. | *Tribulus terrestris L* | Zygophyllaceae | Chota Gokeru Khusha | Saponine, Diosgenine, gitogenine, flaonoids, Alkaloid. |
| 113. | *Urtica dioica L* | Urticaceae | Guelder Rose | Flavonoids,amines steroids,phenols |
| 114. | *Vernonia antheimintica Willid* | Asteraceae | Kalijira | Amino acid,linoleic myristic, oleic,palmitic |
| 115. | *Vitis vinifera L* | Vitaceae | Wine grape | Thiamine,niacin,biotin tocoferol |
| 116. | *Withania somnifora L dunal* | Solanaceae | Ashwagand ha | Alkaloids,steroids,reducing suger, glycosides |
| 117. | *Zingiber officinale(Rose)* | Scitaminaceae | Ginger | Essential oil,volatile oil |
| 118. | *Zizyphus xylopyrus L* | Rhamnaceae | Kath ber | Alkaloid,zizipine |

**Table 1c List of plants having nephroprotective activity (Talele, et al., 2012; Peesa. 2013; Lakshmi et al., *2012*)**

| S.No. | Plant name | Family | Part used |
|---|---|---|---|
| 1 | *Abelmoschus esculentus* | Malvaceae | Fruits, seeds, root |
| 2 | *Abrus precatorious* | Leguminosea | Roots, leaves |
| 3 | *Abutilon indicum* | Malvaceae | Roots, bark |
| 4 | *Acacia Arabica* | Rubaceae | Leaves |
| 5 | *Acacia catechu* | Rubaceae | Bark |
| 6 | *Acacia Sinuate* | Rubaceae | Bark |
| 7 | *Achilla millefolium* | Compositae | Whole plant |
| 8 | *Achyranthes aspera* Amaranthaceae Root bark | Amaranthaceae | Root bark |
| 9 | *Acorus calamus* | Araceae | Aerial parts |
| 10 | *Adianthum lunulatum* | Polypodiaceae | Leaves |
| 11 | *Aegle marmelos* | Rutaceae | Leaves |
| 12 | *Aerva javanica* | Amaranthaceae | Fresh roots |
| 13 | *Aerva lanata* | Amaranthaceae | Whole plant |
| 14 | *Alangium salvifolium* | Alanglaceae | Bulb |
| 15 | *Allium cepa* | Liliaceae | Bulb |

 

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|---|---|---|---|
| 16 | *Amaranthus spinosus* | Amaranthaceae | Root |
| 17 | *Andrographis paniculata* | Acanthace | Root |
| 18 | *Andropogon muricatus* | Graminae | Leaves,flower |
| 19 | *Annona squamosa* | Annonaceae | Leaves, seeds |
| 20 | *Anogeissus latifolia* | Combretaceae | Bark, root |
| 21 | *Anthoxanthum odoratum* | Poaceae | Aerial parts |
| 22 | *Apium graveolens* | Umbelliferae | Root |
| 23 | *Arachis hypogaea* | Fabaceae | Seeds |
| 24 | *Arctium lappa* | Compositae | Root |
| 25 | *Asclepias syriaca* | Asclepiadaceae | Root |
| 26 | *Asparagus racemosus* | Meliaceae | Roots |
| 27 | *Atropa belladona* | Solanaceae | Root |
| 28 | *Avuri kudineer* | Fabaceae | Leaves |
| 29 | *Azadirachta indica* | Meliaceae | Leaves |
| 30 | *Bacopa monnieri* | Scrophulariaceae | Leaves |
| 31 | *Balanites roxburg* | Simarubiacea | Root, fruit |
| 32 | *Baliospermum monatum* | Euphorbiaceae | Root, leaves, seeds |
| 33 | *Bambusa bamboo* | Arundinacea | Leaves |
| 34 | *Bambusa nutans* | Arundinaceae | Leaves |
| 35 | *Barleria prionotis* | Acanthaceae | Flowers, leaves |
| 36 | *Basella alba* | Basellaceae | Leaves |
| 37 | *Bauhinia variegata* | Fabaceae | Stem |
| 38 | *Benincasa* | Cucurbitaceae | Fruit, seeds |
| 39 | *Boerhaavia diffusa* | Nyctaginaceae | Whole plant |
| 40 | *Bombax ceiba* | Bombacaceae | Fruits |
| 41 | *Boswellia serrata* | Frankincense | Gum |
| 42 | *Brassica oleraccia* | Brassicaceae | Leaves |
| 43 | *Brassica oleraccia* | Brassicaceae | Leaves |
| 44 | *Bridelia retusa* | Phyllanthaceae | Bark |
| 45 | *Cajanus cajan* | Fabaceae | Leaves, seeds |
| 46 | *Canarium schweinfurthii* | Poaceae | Stem bark |
| 47 | *Cardiospermum helicacabum* | Sapindaceae | Root, leaves |
| 48 | *Carica papaya* | Caricaceae | Fruits |
| 49 | *Cassia absus* | Leguminoseae | Seeds, leaves |
| 50 | *Cassia auriculata* | Fabaceae | Root |
| 51 | *Cassia fistula* | Leguminoseae | Leaves |
| 52 | *Cayratia carnosa* | Vitaceae | Leaves |
| 53 | *Chelidonium jajus* | Papaveraceae | Flowers |
| 54 | *Clitoria ternatea* | Papilionaceae | Aerial parts |
| 55 | *Cocos nucifera L.* | Arecaceae | Fruits, seeds, Leaves |
| 56 | *Commiphora mukul* | Burseraceae | Gum |
| 57 | *Cordia dichotoma* | Boraginaceae | Fruits |
| 58 | *Crataeva nurvula* | Capparidaceae | Fruit |

 

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|---|---|---|---|
| 59 | *Crataeva nurvula* | Capparaceae | Stem bark |
| 60 | *Cucurbita pepo* | Cucurbitaceae | Seeds |
| 61 | *Curculigo orchioides* | Amartllidaceae | Roots |
| 62 | *Curcuma longa* | Zingeberaceae | Rhizome |
| 63 | *Cynodon dactylon* | Gramineae | Roots |
| 64 | *Cyperus rotundus* | Cyperaceae | Rhizome |
| 65 | *Datura metal* | Solanaceae | Leave, flower |
| 66 | *Daucus carota* | Apiaceae | leaves |
| 67 | *Desmodium gangeticum* | Fabaceae | Root |
| 68 | *Dichrostachys cinera* | Mimioseae | Root |
| 69 | *Digitalis purpurea* | Scrophulariaceae | Leaves |
| 70 | *Dioscorea lanata* | Dioscoreaceae | Whole plant |
| 71 | *Diospyros lotus* | Ebenaceae | Seeds |
| 72 | *Dolichos biflorus* | Leguminoseae Seeds | Seeds |
| 73 | *Elephantophus scaber* | Asteraceae | Leaves |
| 74 | *Elettaria cardamomum* | Zingiberaceae | Seeds |
| 75 | *Emblica officinalis* | Euphorbiaceae | Fruit |
| 76 | *Ficus hispida* | Moraceae | Fruits |
| 77 | *Ficus religiosa* | Moraceae | Latex |
| 78 | *Foeniculum vulgare* | Apiaceae | Seeds, flowers |
| 79 | *Glycyrrhiza glabra* | Fabaceae | Rhizome |
| 80 | *Gossypium arboretum* | Malvaceae | Leaves |
| 81 | *Gymnema sylvestre* | Asclepiadaceae | Leave, whole plant |
| 82 | *Haldina cordifolia* | Rubiaceae | Bark |
| 83 | *Helianthus annus* | Compositae | Seeds, Root, leaves |
| 84 | *Hemidesmus indicus* | Asclepiadaceae | Root, leaves, seeds |
| 85 | *Hibiscus sabdariffa* | Malvaceae | Leaves |
| 86 | *Holarrhena antidysenterica* | Apocynaceae | Bark, seeds |
| 87 | *Humulus lupulns* | Cannabidaceae | Fruits |
| 88 | *Hygrophila auriculata* | Acanthaceae | Roots, leaves |
| 89 | *Indigofera aspalathoides* | Fabaceae | Stems |
| 90 | *Indigofera barberi* | Fabaceae | Whole plant |
| 91 | *Ipomoea digitata* | Convolvulaceae | Root |
| 92 | *Jasmium grandiflorum* | Oleaceae | Leaves |
| 93 | *Kalanchoepinnata pars* | Crassulaceae | Leaves |
| 94 | *Kigelia africana* | Bignoniaceae | Matured fruits |
| 95 | *Lanata camara* | Verbenaceae | Roots |
| 96 | *Lawsonia inermis* | Lythraceae | Roots, leaves, seeds |
| 97 | *Lepidium sativum* | Brassicaceae | Seeds |
| 98 | *Leptadenia reticulate* | Asclepiadaceae | Root |
| 99 | *Linum usitatissimum* | Linaceae | Roots, Seed |
| 100 | *Macrothelypteris oligophlebia* | Thelypteridaceae | Rhizome |
| 101 | *Mangifera indica* | Anacardiaceae | Leaves |

 

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|---|---|---|---|
| 102 | *Mentha arvensis* | Leaves | Leaves |
| 103 | *Merremia emarginata* | Convohrelaceae | Whole plant |
| 104 | *Mesua ferrea* | Guttiferae | Seed |
| 105 | *Michelia champaca* | Magnoliaceae | Leaves |
| 106 | *Mimosa pudica* | Leguminaceae | Leaves, root |
| 107 | *Momordica dioica* | Meliaceae | Root |
| 108 | *Monochoria vaginalis* | Pontederiaceae | Aerial parts |
| 109 | *Morinda citrifolia* | Rubiaceae | Fruit |
| 110 | *Moringa oleifera* | Moringaceae | Flowers |
| 111 | *Mucana prursiens* | Leguminoseae | Seeds, Root |
| 112 | *Mucuna adana* | Leguminoseae | Seeds, Root |
| 113 | *Murraya koienigii* | Rutaceae | Leaves, Root |
| 114 | *Musa paradisiaca* | Musaceae | Seeds |
| 115 | *Nelumbium nucifera* | Nelumbonaceae | Rhizome, seeds, flower, leaves |
| 116 | *Nerium indicum* | Apocynaceae | Root, leaves |
| 117 | *Nigella sativa* | Rannunculaceae | Whole plant |
| 118 | *Nyctanthes arbortristis* | Oleaceae | Leaves |
| 119 | *Ocimum basilicum* | Lamiaceae | Leaves |
| 120 | *Ocimum canum* | Lamiaceae | Leaves |
| 121 | *Ocimum sanctum* | Lamiaceae | Whole plant |
| 122 | *Orchis latifolia* | Orchidaceae | Whole plant |
| 123 | *Orthosiphon stamineus* | Laminaceae | Whole plant |
| 124 | *Oryza saliva* | Gramineae | Seeds |
| 125 | *Ougeinia oojeinensis* | Fabaceae | Bark |
| 126 | *Paederia foetida* | Rubiaceae | Root, leaves |
| 127 | *Panax ginseng* | Araliaceae | Root |
| 128 | *Pandanus odoratissimus* | Pandanaceae | Leaves |
| 129 | *Pedalium murex* | Pedaliaceae | Seeds, leaves |
| 130 | *Phaseolus mungo* | Leguminoseae | seeds |
| 131 | *Phyllanthus niruri* | Euphorbiaceae | Seeds |
| 132 | *Phyllanthus reticulates* | Euphorbiaceae | Leaves |
| 133 | *Phyllanthus urinaria Linn.* | Euphorbiaceae | Seeds |
| 134 | *Picrohiza kurroa* | Scrophulariaceae | Rhizome |
| 135 | *Pimpinella anisum* | Umbelliferae | Leaves |
| 136 | *Piper cubeba* | Piperaceae s | Seeds |
| 137 | *Piper nigrum* | Piperaceae | Seeds |
| 138 | *Plectranthus amboinicus* | Lamiaceae | Leaves |
| 139 | *Prosthechea michuacana* | Orchidaceae | Bulbs |
| 140 | *Psidium guajava* | Myrtaceae | Leaves |
| 141 | *Rhazya stricta* | Apocynaceae | Leaves |
| 142 | *Saccharum officianarum* | oaceae | Seeds, root |
| 143 | *Salix caprea* | Salicaceae | Flowers |
| 144 | *Salviae radix* | Lamiaceae | Whole plant |

 

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|---|---|---|---|
| 145 | *Santalum album* | Santalaceae | Root |
| 146 | *Saracca indica* | Leguminosae | Leaves, seeds |
| 147 | *Securinega leucopyrus* | Euphorbiaceae | Leaves |
| 148 | *Sida cordifolia* | Malvaceae | Root |
| 149 | *Solanum indicum* | Solanaceae | Whole plant |
| 150 | *Solanum nigrum* | Solanaceae | Whole plant |
| 151 | *Solanum surattense* | Solanaceae | Fruit, Flower |
| 152 | *Solanum xanthocarpum* | Solanaceae | Root |
| 153 | *Solena amplexicaulis* | Umbellifera | Root |
| 154 | *Sorgham vulagare* | Graminae | Seeds |
| 155 | *Spathodea campanulata* | Bignoniaceae | Bark |
| 156 | *Sphaeranthus indicus* | Compositae | Leaves, flower |
| 157 | *Strychnos potatorum* | Loganiaceae | Seeds |
| 158 | *Tamarindus indica* | Caesalpinaceae | Leave, flower |
| 159 | *Tectona grandis* | Verbenaceae | Whole plant |
| 160 | *Tephrosia purpurea* | Zingiberaceae | Seeds |
| 161 | *Terminalia chebula* | Combretaceae | Seeds |
| 162 | *Tribulus sativus* | Zygophyllaceae | Fruit |
| 163 | *Tribulus terrestris* | Zygophyllaceae | Whole plant |
| 164 | *Urtica dioica* | Urticaceae | Roots |
| 165 | *Vernonia antheimintica* | Asteraceae | Fruits |
| 166 | *Vernonia cinerea* | Asteraceae | Aerial parts |
| 167 | *Vigna mungo* | Fabaceae | Seeds |
| 168 | *Vitis vinifera* | Vitaceae | Fruits |
| 169 | *Withania somnifera* | Solanaceae | Leaves |
| 170 | *Zingiber officinale* | Zinziberaceae | Rhizome |
| 171 | *Zizyphus rugosa* | Rhamnaceae | Leaves |

**Table 2.Indigenous plants used against burning micturation**

| Sr. No. | *Name of Plant* | Family | V. Name | Active principle |
|---|---|---|---|---|
| 1 | *Andropogon muricatus Retz.* | Graminae | Kalavala | Essential oil |
| 2 | *Boerhavia diffusa L.* | Nyctaginaceae | Punarnava | Alkaloids,triacontanol,βsitosterol, glucose, fructose |
| 3 | *Bombax ceiba L.* | Bombacaceae | Salmali | Tannins, β–sitosterol, D-glucoside. |
| 4 | *Clitoria terneata L.* | Papilionaceae | Aparajita | Teraxeron,glucoside,oligosaccharide |
| 5 | *Cordia dichotoma Forst* | Boraginaceae | Bhoker | Tannin, Flavonoid, Saponin. |
| 6 | *Desmodium gangeticum L* | Leguminosae | Lapeta, chik | Alkaloid, Gangetin. |
| 7 | *Glyucerrhiza glabra L* | Leguminosae | Bahava, Gambhari | Volatileoil, esragole, anethole. |

 

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| 8 | *Gmeliana arborea(Roxb)* | Verbenaceae | Jivanti | Volatileoil,suger |
| 9 | *Leptadenia reticulataW.&A* | Asclepiadaceae | Gokarna, Bibli | Stigma sterol,tocopherol |
| 10 | *Mallotus philippinensis(Muell)* | Euphorbiaceae | Kamla | Rottlerin,Isorottlerin, resin,wax |
| 11 | *Phllanthus neruri L* | Euphorbiaceae | Bhuiamla | Phyllanthin,hypo Phyllanthin, |
| 12 | *Raphanus sativus L* | Crucifereae | Radish | Essentialoil,Glucoside,enzyme,methyelmercaptane |
| 13 | *Rosa damascene(Mill)* | Rosaceae | Rose | Essential oil |
| 14 | *Rumex vesicularis L* | Polygonaceae | Chukra | Glucoside,resine Tannine |
| 15 | *Terminalia paniculata (Aruna)* | Combretaceae | Sal dhaval | β-sitosterol, triterpene, carboxylic acid glucoside, dimethyl ellagic acid |

**Table 3.Indigenous plants used to eradicate kidney stone formation**

| Sr. No | Name of Plant | Family | V. Name | Active principle |
|---|---|---|---|---|
| 1 | *Aerva Lanata L.* | Amaranthaceae | Kupruri | α-amyrin, campesterol, β-sitosterol & β-sitosteryl, palamitate, chrysin & four flavonoid glyacosides |
| 2 | *Baliospermum Montanum Willd.muell-Arg* | Euphorbiaceae | Danti | Phorobl esters, diterpene, hydrocarbon, β-stiosterol, D-glucoside |
| 3 | *Bridelia retusa Sprang* | Euphorbiaceae | Ftthar fode | Tannin,oil |
| 4 | *Commiphora Mukul (Hookexstocks )* | Burseraceae | Gugal | Guggulsterone-E, Z, Guggulsteron I-VI cholesterol, seasamin camphorene, cambrane A-etc |
| 5 | *Coriandrum Salivum L.* | Umbelliferae | Dhaniya | Flavonoid, Glycoside, Fixed oil. |
| 6 | *Crataeva Religoea Buch, Ham* | Capparidaceae | Varun | |
| 7 | *Datura Metel L.* | Solanaceae | White datura | Alkaloids, scopolamine, hyposcymine, Atropin, vita C |
| 8 | *Dolichosbiflorus L.* | Fabaceae | Kulith | Urease, lectin carbohydrate N-acetyl glucosamine, N-β. Glycosidically |
| 9 | *Eclipta alba L.* | Asteraceae | Bhrangarajah, | Thiophene, petroleum ether, tertheinyl aldehyde β-sitosterol |
| 10 | *Murraya Koenigii L.* | Rutaceae | Kurry patta | Oil, b-caryophyllene, b-gurjunene, b-elemene & b-phellandrene |

 

**Table 4.Nephroprotective plants of Khandesh Region**

| Sr. No. | Name of Plant | Family | V. Name | Active principle |
|---|---|---|---|---|
| 1. | *Abutilon indicum L* | Malvaceae | Atibalaa | Asparagines,Mucilage,Tannin, alkaloids |
| 2. | *Acacia arabica(Willd)* | Leguminosae | Babul | Tannin,Flavonoid |
| 3. | *Achyranthes aspera L.* | Amaranthaceae | Aghada | Alkaloids,saponin,Tannin Oil |
| 4. | *Allium cepa L.* | Liliaceae | Onian | Essential oil orgnic sulphideFlavonoid,phenolic acid |
| 5. | *Andropogon muricatus Retz.* | Graminae | Kalavala | Essential oil |
| 6. | *Anona Squamosa L* | Annonaceae | Custard apple | AlkaloidAminoacids,camphor,anonaine |
| 7. | *Arachis hypogaea L* | Fabaceae | Mung-phali | Vit e,Flavonoid,Tannins |
| 8. | *Asclepias syriaca L.* | Asclepiadaceae | Mohari | Glucol, asclepiadin |
| 9. | *Asparagus racemosus Willd* | Liliaceae | Shatavari | Oil,saponin |
| 10. | *Azadirachta indica L* | Meliaceae | Nimb | Alkaloid, steroid, Azardin, Resin, tannine, fixed oils |
| 11. | *Bacopa monnieri L* | Scrophulariaceae | Brahmmi | Essential oil,Alkaloid |
| 12. | *Barleria prionitis Linn.* | Aceanthaceae | Kate-Koranti | Essential oil,Flavonoid Glycoside, β-sitosterol |
| 13. | *Basella alba L* | Basellaceae | Indian spinach | Iodine,fiuorine,carotenoidsFlavonoid |
| 14. | *Boerhavia diffusa L.* | Nyctaginaceae | Punarnava | Alkaloids,triacontanol,βsitosterol,glucose,fructose |
| 15. | *Bombax ceiba L.* | Bombacaceae | Salmali | Tannins,β–sitosterol,D-glucoside. |
| 16. | *Brassica oleracea L* | Brasscaceae | Cabbage | Essentinl, aminoacid |
| 17. | *Butea monosperma Lam* | Fabaceae | Palash | GlucosideButine,proteolytic lipolytic enzyme, Flavonoid |
| 18. | *Cajanus cajan L Millsp* | Fabaceae | Tuvar | Amino acid,galactosid |
| 19. | *Carica papaya L.* | Caricaceae | Papaya | Alkaloid,papain enzymes. |
| 20. | *Cassia absus L.* | Caesalpiniaceae | Ran Kulith | Alkaloid,Sitosterol,Glucoside. |
| 21. | *Cassia fistula L.* | Caesalpiniaceae | Bahava | Glycoside,Tannin,Flavonoid. |
| 22. | *Clitoria terneata L.* | Papilionaceae | Aparajita | Teraxeron,glucoside,oligosaccharide |
| 23. | *Commiphora mukul* Engl | Burseraceae | Guggal | Guggulsterone,Flavonoid. |
| 24. | *Cordia dichotoma Forst* | Boraginaceae | Bhoker | Alkaloid, Tannin |
| 25. | *Crataeva Religoea Buch,Ham* | Capparidaceae | Varun | Linalool, linalyl acetate, thymol, β-caryphyllene α-pinene borneol, limonene, β- |

 

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| | | | | pheliandrene, citranellol |
| 26. | *Curculigo orchioidesGaertn* | Amaryllidaceae | Kalimusli | Saponine,curculigo,phenolicglycoside |
| 27. | *Cynodon dactylon Pers* | Gramineae | Durva | β-ionone,2-propionic 4-hydroxybenzoic |
| 28. | *Cyperus rotundus L* | Cyperaceae | Nagermotha | Essentialoil,cyperene,cyperol,starch β-sitosterol |
| 29. | *Datura metal L* | Solanaceae | Datura | Alkaloid,scopolamine,hyposcymine,atropin,vitaC |
| 30. | *Daucus carota L* | Umbelliferae | Carrot | Oil, carotol essential oil,Flavones |
| 31. | *Dolichos biflorus L* | Leguminosae | Kulith | Urease,lectin carbohydrate |
| 32. | *Ficus religiosa L* | Moraceae | Piple | Arabinose,mannose,glucose β-sitosterol D-glucoside |
| 33. | *Gmeliana arborea(Roxb)* | Verbenaceae | Jivanti | Volatileoil,suger |
| 34. | *Gossypium arboretum L.* | Malvaceae | Cotton | Betaine, choline, Salicylic acid. |
| 35. | *Gymnema sylvestrer(Retz)R.Br* | Asclepiadaceae | Gudmar | Saponine,I-V,gymnemic acid |
| 36. | *Helianthus annus L.* | Compositae | Sunflower | Albumin.globulin,glutelin, βsitosterol |
| 37. | *Hemidesmus indicus L.* | Asclepiadaceae | Anant mul | Essential oil,Steroid,saponin,resine tannine |
| 38. | *Hibiscus sabdariffa L.* | Malvaceae | China Rose | Organic acid anthocyanin vitamin C |
| 39. | *Holarrhena antidysentrica* | Apocynaceae | Kala-Kuda | Alkaloids, tannin, Triterpene, |
| 40. | *Hygrophila auriculata K.Schum.* | Acanthaceae | Neermali | Fattyoil,alkaloid,calcium,phosphate,K,CL |
| 41. | *Jasmium grandiflorum L.* | Oleaceae | Chameli | Alkaloid, essencial oil,Ascorbic acid Glucoside |
| 42. | *Leptadenia reticulataW.&A* | Asclepiadaceae | Jivanti | Stigma sterol,tocopherol |
| 43. | *Leptadenia reticulataW.&A* | Asclepiadaceae | Gokarna, | Stigma sterol,tocopherol |
| 44. | *Linum usitatissimum L.* | Linaceae | Aalsi | fixed oil protene wax,resin,sugar glycoside |
| 45. | *Mangiifera indica L.* | Anacardiaceae | Mango Plant | Flavonoid Phenolic acidVitamin ABCD |
| 46. | *Menta arvensis L.* | Labiatae | Podina | Essentialoil,carvones |
| 47. | *Michelia champaca L.* | Magnoliaceae | Champa | Essentialoil fatty oil |
| 48. | *Mimosa pudica L.* | Leguminosae | Lajalu | Alkaloids,Mimosine |

 

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| 49. | *Momordica dioica Roxb ex willd* | Cucurbitaceae | Jangali karelaa | Glycoside,saponin |
| 50. | *Moringa oleifera Lam* | Moringaceae | Drumstick tree | Carotene,nicotic acid,ascorbic acid,amino acid |
| 51. | *Mucana pruriens L.* | Leguminosae | Khajkuiri | Calcium,phosphorus,iron,sulphur,alkaloids |
| 52. | *Murraya Koenigii L* | Rutaceae | Karry patta | Oil,b-caryophyllene,b-gurjunene,b-Carbazol,Alkaloid |
| 53. | *Musa paradiciaea L* | Scistaminaceae | Banana | Albumin,globulin,glutelin,proteoses |
| 54. | *Nelumbium nucifera gaertn* | Nelumbonaceae | Lotus | Alkaloids,nuciferine,protene sugar, vitamin |
| 55. | *Nerium indicumMill* | Apocynaceae | Kaner | Glycoside Digitoxigenin |
| 56. | *Nyctanthus arboterresris L* | Oleaceae | Parijat | Oil,manitol,tannin, βsitosterol |
| 57. | *Ocimum Sanctum L* | Labiatae | Tulasi | Eugenol,methol,ether,carvacol |
| 58. | *Paederia foetida L* | Rubiaceae | Hirenwel | Essential oil, Alkaloids,foetida |
| 59. | *Phaseolus mungo L* | Leguminoseae | Green gram | 2.8%ash,Oil |
| 60. | *Phllanthus neruri L* | Euphorbiaceae | Bhuiamla | Phyllanthin,hypo Phyllanthin, |
| 61. | *Phyllanthus niruri L* | Euphorbiaceae | Bhui awala | Alkaloid,Flavonoids, Phyllanthin,,hypophyiianthin |
| 62. | *Pimpinella anisum L.* | Umbelliferae | Rajanigandha | Volatile oil,flavonoid,Sterol |
| 63. | *Raphanus sativus L* | Crucifereae | Radish | Essentialoil,Glucoside,enzyeme ,methyelmercaptane |
| 64. | *Rosa damascene(Mill)* | Rosaceae | Rose | Essential oil |
| 65. | *Saccharum officinarum L* | Poaceae | Suger cane | Phenol,Glycolicacid |
| 66. | *Santalum album L.* | Santalaeae | Safed Chandan | Santalbic acid,palmitic acid, olic acid |
| 67. | *Solanum indicum L* | Solanaceae | Dorli | Alkaloid,enzymes |
| 68. | *Solanum xantocarpum schrad&Wendell* | Solanaceae | Kateringani | carpesterol,Glucoside,Alkaloid, solanocarpine |
| 69. | *Sorgham vulagare L* | Graminae | Jawar | Glucoside, Dhurin |
| 70. | *Sphaeranthus indicusL* | Compositae | Gorkhmundi | Alkaloid,sphaeranthine,essential oil |
| 71. | *Tamarindus indica L* | Caesalpiniacae | Imli | Tartaric acid,citricacid maleicacid flavonoid, glycosides |
| 72. | *Tectona grandis L* | Verbenaceae | Teak | Calcium,phosphate,silica ammonium mg |
| 73. | *Tephrosia purpurpa L* | Fabaceae | Sarphonka | Tephrosin,rotenone |
| 74. | *Terminalia chebula Retz* | Combrataceae | Hirda | Palmitic stearic oleic linoleic,Astrigent,tannic acid |
| 75. | *Terminalia paniculata* | Combretaceae | Sal dhaval | β-sitosterol, triterpene, |

 

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|---|---|---|---|---|
| | *(Arjuna)* | | | carboxylic acid glucoside, dimethyl ellagic acid |
| 76. | *Tribulus terrestris L* | Zygophyllaceae | Chota Gokeru | Saponine, Diosgenine, gitogenine, flaonoids, Alkaloid. |
| 77. | *Vernonia antheimintica Willid* | Asteraceae | Kalijira | Amino acid,linoleic myristic, oleic,palmitic |
| 78. | *Withania somnifora L dunal* | Solanaceae | Ashwagandha | Alkaloids,steroids,reducing suger, glycosides |

## DISCUSSION

The people of India are well acquainted with a large number of indigenous medicinal plants than the natives of any other countries. Herbs are the principal form of medicine in India and they are becoming popular throughout the world. Thus, information generated from the present study deals about mostly medicinal plant as diuretic activity; some are medicinal plant used in burning urination and few medicinal plants against stone formation. The most dominant family is Euphorbiaceae. The leaves are most frequently used in the treatment of nephrotoxicity than rest of aerial plant. This review provides comprehensive account on nephroprotective indigenous plants (Ghaisas et al., 2010; Welta et al., 2007; Kore and Shete. 2011; Pracheta et al., 2011; Divakar et al., 2010; Ahmed and Eid Ali. 2010). It is aimed to record medicinal folk-lore for curing nephrotoxicity that exist in threatening stage. In India ayruevedic referred system of medicines several, herbal drugs and are prescribed for reducing renal damage and to avoid kidney related complication. These can be immense value in combating renal damage. Best endeavors of indigenous herbs to alternative medicine of renal damage. On going through various studies on treatment of kidney disorders, it seems that herbal plants play unique role as medicine. There is no synthetic drug which relieves fully insufficiency of kidney. But indigenous plant possesses tissue rejuvenator property which is any way unavoidable. This may perhaps be the reason why in numerous cases, which synthetic medicines fails, indigenous system of medication succeed (Ali. 2003; Servais et al., 2008; Kannappan et al., 2010; Varghese et al., 2011; Movaliya et al., 2011; Debnath et al., 2010; Yadav et al., 2011; Shelke et al., 2009; Sreedevi et al., 2011; Palani et al., 2010; Surendra et al., 2011; Palani et al., 2008; Palani et al., 2009; Molina-Jijon et al., 2011; Kore et al., 2011; Alam et al., 2007; Ranjan et al., 2009; Madhukkal et al, 2009). He worked on fifteen medicinal plants, their active principle and more emphasized on renal physiology. The present investigation comprises 143 species of ethnomedicinally important plants of Maharashtra and 78 species from khandesh region out of which around 61 families used to cure kidney diseases (Al-Qarawi et al., 2008; Adeneye and Benebo. 2008; Bhattacharjee. 2004; Chopda and Mahajan. 2009; Chopra et al., 1999; Gupta et al., 2004; Jain. 1991; Khare. 2007; Kirtikar and Basu. 1995; Kshirsagar and Patil. 2008; Kshirsagar and Patil. 2008; Meena et al., 2009; Latheef et al., 2009; Khan et al., 2008; Prajapathi et al., 2003; Pushpagadan and Kumar. 2005; Taayade and Patil. 2006 ; Yarnell. 2007).

 

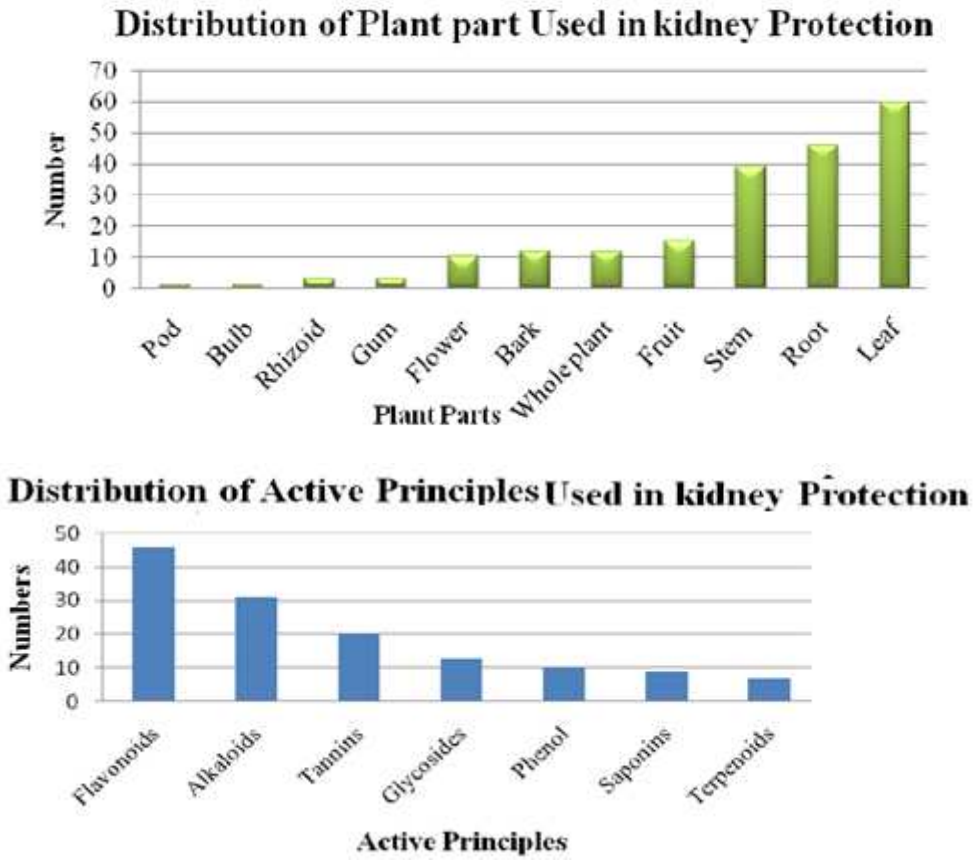


**Figure 1.Summarizes relative part used and phytoconstitues of plants used in nephroprotection**

Tribal people furnished valuable information regarding traditional uses of local plants like *Dolichos biflorus, Achyranthes aspera, Andropogon muricatus*. The native tribe of village namely Chinchpura and Boritanda told us and without any hesitation use of these plants as nephroprotective. The information generated from the present study according to table 1, 2 & 3. Euphorbiaceae-9.83% and leguminaceae-9.83% was the most commonly used family and rest of the data is as follows solanaceae-6.55%, labiateae-6.33%, ascle piadaceae - 4.91%. Phytochemical ranking of active principle is, flavonoid > alkaloid > tannin > glycosides > phenol > saponin > terpenoids. Among all the plant parts maximally leaves are used in nephroprotective plant. On the basis of information received from local tribes, we have formulated and developed herbal formulation to validate the claim of thesis. Data on nephroprotective plants is prepared as *Achyranthes aspera*, (leaves)*Bauhinia racemosa* (stem bark) *Tiphrozea purpura* (root) *Tectona grandis* (seed) *Tribulus terrestris* (leaves) *Andropogen muricatus* (root) *Dolichos biflorus,* (seed) using a gentamicin induce nephrotoxicity model, this herbal formulation gave 75% protection in rat. Ethnomedicinally important plants used by traditional people needs to be evaluated for proper phytochemical analysis, level of toxicity. Extraction and isolation along with few clinical trials phytochemical examination of these plants may lead to development of potential bio-product in the treatment of disease and disorders of renal disease, this could help in creating mass awareness about conservation of such plants to promote ethno- medico-botany knowledge within the region, besides contributing to the preservation of such medicinally important species before they are extinct. Method reported queries with different local herbalists in different seasons and comparison with the

 

plant species which are used in the treatment of renal damage is crucial and valuable.

## CONCLUSION

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 nephroprotective activity in animal models. The nephroprotective activity is probably due to the presence of Flavanoids in all the few medicinal plants. The results of this study indicate that extracts of leaves and plants of some medicinal plants have good potentials for use in kidney damage. The present review study give evidential explore mechanism of action of medicinal plants against experimentally induced nephrotoxicity. Hence, the review of the study is concluded that the herbal drug possesses nephroprotective activity and it has been proven by different animal models which gives many links to develop the future trials. It is aimed to record medicinal folk-lore for curing nephrotoxicity that exists in threatening stage. In India ayurvedic referred system, several herbs are prescribed for reducing renal damage and to avoid kidney related complications. These can be immense value in combating renal damage. In this paper, we have attempted to use our best endeavors of indigenous herbs to alternative medicine of renal damage.

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