International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 6 Issue 7, November-December 2022 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Study of Medicinal Plants in Management of Naphrotoxicity

Ms. Jyoti Singh[1], Dr. Bishnu Kumar[2], Dr. Shailesh Gupta[3]

[1]Department of Pharmacology, Mansarovar Global University, Bilkisganj, Madhya Pradesh, India
[2]Associate Professor, BAMC Medical College, Uttar Pradesh, India
[3]Professor in Department of Pharmacology, Mansarovar Global University, Bilkisganj, Madhya Pradesh, India

ABSTRACT

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. Agents Which Causes Nephrotoxicity Drugs, diagnostic agents & chemical are well known to be nephrotoxic.

To avoid the side effect of synthetic drug there is need to develop a safe and effective Polyherbal In view of foregoing consideration. Our present study aims at the scientific validation of nephroprotective and antioxidant properties of selected plant and formulation of suitable novel dosage so that new herbal drug will come in the market.

KEYWORDS: *Bark extract of Ficus racemosa, medicinal plants, toxicity, antioxidant and Nephprrootective activity*

How to cite this paper: Ms. Jyoti Singh | Dr. Bishnu Kumar | Dr. Shailesh Gupta "Study of Medicinal Plants in Management of Naphrotoxicity" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-6 | Issue-7, December 2022, pp.962-967, URL: www.ijtsrd.com/papers/ijtsrd52459.pdf

IJTSRD52459

Copyright © 2022 by author (s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (http://creativecommons.org/licenses/by/4.0)

IJTSRD International Journal of Trend in Scientific Research and Development ISSN: 2456-6470

Materials and methods

1. References of Nephrotoxic drugs have been collected from the classical books of Ayurveda
2. All the data is compiled, analyzed and discussed through in depth for *Medicinal Plants for its management of Naphrotoxicity* from authentic sources.
3. Ayurvedic and modern approach have been compiled in this review

Aim and Objectives

Our present study aims at the scientific validation of nephroprotective and antioxidant properties of selected plant so that new herbal drug will come in the market.

INTRODUCTION

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, chemotherapeutic agents have been added to the therapeutic arsenal in recent years. 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. 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. Coadministration 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. 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.[1-6].

Ayurveda and other traditional medical practitioners from different countries have claimed for centuries that extracts of plants can be effectively used for the alleviation of different types of liver diseases. But most claims are anecdotal and very few have received adequate medical or scientific evaluation. Except for the use of appropriate vaccine for the treatment of hepatitis caused by viral infection, there are few effective plants that cure liver diseases. Therefore, it is not surprising that a considerable interest has been developed in the examination of those numerous worldwide traditional plant remedies, which are used for such treatment and that on recent years investigations are carried out to provide experimental evidence, which confirms that many of these plants do indeed have Nephroprotective properties. Recent progress in the study of such plant has resulted in the isolation of about 170 different phytoconstituent from plants belonging to about 55 families, which exhibit Nephroprotective activity. raditional system of medicine has plants, used for centuries for protecting liver for the treatment of liver dysfunctions. Ancient literature also mentions herbal medicine is related diseases namely Memory lose, Osteoporosis, Diabetic wounds, Immune and Liver disorders etc, for which in modern medicine or only palliative therapy is available.

Indian system of traditional medicine it is presumed that the knowledge of ayurveda is given by gods of a different world. it is accepted as the oldest written medical system that is also supposed to be more effective in certain cases than modern therapies.

India, a veritable emporium of plants, occupies the topmost place among the leading users of herbal medicines. India the abode of Ayurvedic system of medicine, assigns much importance to the pharmacological aspects of many plants. Herbal drugs are playing an important role in health care programmes worldwide and there is a resurgence interest in herbal medicines for treatment of various ailments including haptopathy.

India has an ancient heritage of traditional medicine. material medica of India provide lots of information on the folklore practices and traditional aspect of therapeutically important natural products. Indian traditional medicine is based on various systems including ayurveda, sidda and unani. The evaluation of these drugs is mostly based on phytochemical, pharmacologically and allied approaches including various instrumental techniques like chromatography, microscopy and common thread running through these system in their fundamental principle and practices.

Herbal drugs are constitutes a major part in all the traditional system of medicine. Herbal medicine is a triumph of popular therapeutic diversity. Plants above all other agent have been used for medicine from time immemorial because they have fitted the immediate personal need. there are approximately 1250 Indian plant medicinal plant ,which are used in formulating of therapeutic preparation according to ayurveda and other traditional system of medicines.

Herbal drugs are constitutes a major part in all the traditional system of medicine.. Herbal medicine is a triumph of popular therapeutic diversity.

Agents Which Causes Nephrotoxicity Drugs, diagnostic agents & chemical are well known to be nephrotoxic. The following are some of the important nephrotoxic agents[7].

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

D. Aminoglycosides : Gentamycin, Amikacin, Kanamycin, Streptomycin

E. Miscellaneous Radiocontrast agents: Non-steroidal anti-inflammatory agents (NSAID's): Ibuprofen, Indomethacin, Aspirin etc.

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 abortifacients5,6. 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.[5,8].

The source of nephro protective agent Demands of herbal medicines are increasing as they are getting more recognition for being cheaper and without any side effects. Medicinal plants are used in both developed and developing countries. Studies have been carried out on adopting newer measures of preventing cisplatin side effects at tumoricidal doses towards attenuation of Nephrotoxicity, nephrotoxicity and others so as to save the lives of millions of cancer patients (Mora et al. 2003).

A numbers of adjuvants and supplements are being tried to limit the toxicity of these drugs. Many herbs have been proven to be effectual as nephroprotective agents, while many more are claimed to be nephroprotective but lack any such scientific evidence to support such claims. Works so far carried out on nephrotoxicity due to the ill effects of chemotherapeutic drugs as well as the stimulation of activity of drugs leading to the pronounced apoptosis having lesser toxicity are quite scanty. Azima tetracantha is an ancient medicinal plant used in Siddha and Ayurvedic systems of medicine. It is proved by scientific study that the ethanol root extract of A. tetracantha is found to have nephroprotective effect in glycerol-induced acute renal failure in wistar albino rat model. The root extract is found to have significant protective effect at 500 mg/kg body weight. The phytochemical constituents such as flavonoids, terpinoids, tannins, glucosinolate and saponins are present in this medicinal plant which possibly responsible for the antioxidant, anti-inflammatory, vasodilatory and diuretic activity (Rao et al. 2016).

Croton zambesicus is a famous ornamental plant grown in villages and towns in Nigeria and this species is widely spread in tropical Africa. The roots are used as antimalarial, febrifuge and antidiabetic agent. Scientist proved that the ethanol extract of root part of C. zambesicus protects against gentamicin-induced kidney toxicity when treated as an adjuvant along with the anticancer drug (Jude et al. 2011).

Murraya koenigii comes under the family Rutaceae and commonly known as Curry leaf plant is traditionally a highly valued plant. It is used in many ways for its medicinal value and characteristic aroma. Studies showed that M. koenigii extract is potent against nephrotoxicity caused by Cyclophosphamide, which is a widely used anticancer drug but it causes nephrotoxicity (Patel et al. 2017).

Plumbago zeylanica L. is a medicinal plant greatly valued in Ayurveda and it has Nephroprotective, anti-inflammatory, anti-diabetic, anti-cancer and antihyperlipidemic activities.

Rajakrishnan et al. (2017) had studied the protective effect of hydroalcoholic extract of this plant extract in cisplatin induced nephrotoxicity in Swiss albino mice model. They found that the hydroalcoholic extract of P zeylanica produced significant reversal of cisplatin induced kidney damages as indicated by measured biochemical parameters at higher dose of 400 mg/kg b.w (Rajakrishnan et al. 2017). Aloe vera has been used for medicinal purposes in several countries including Greece, Egypt, India, Mexico, Japan and China. Researchers proved that the aqueous leaf extract of Aloe barbadensis has nephroprotective effect on gentamicin and cisplatininduced nephrotoxicity in wistar rat model.

Kumar et al. (2011) investigated about the pre-treatment of aqueous extract of Boerhaavia diffusa root in repeated dose against acetaminophen nephrotoxic rats for 14 days. Histopathological and biochemical changes showed that the extract is potent against acetaminophen caused damages to kidneys like tubular necrosis.

Few other medicinal plants such as Pimpinella tirupatiensis (Apiaceae family), Indigofera barberi, Aegle marmelos and Tectona grandis also proved to have significant nephroprotectivity in animal models (Chatterjee et al. 2014, Surendra et al. 2011). The nephroprotective activity is probably due to the presence of flavonoids in all few herbal plants and for their antioxidant properties as described by many studies. The results of all this study indicate that plant extracts of some medicinal plant have good potentials for use in renal disease. Thus we can explore some other ethanomedicinal plants against experimentally induced nephrotoxicity.

LITERATURE SURVEY

Chandrashekhar CH *et al*., (2008) were evaluated the anthelmintic activity of the bark extract of *Ficus racemosa* using adult earth warms**.** The bark extract of this plant has exhibited dose- dependent inhibition of spontaneous motility (paralysis) response. The anthelmintic effect was compared with the effects produced by the standard anthelmintic drug 3% piperazine citrate.

Abu Hassanat *at al.,* (2011) were evaluated the hypoglycemic and in vitro antioxidant activity of ethanol extracts of this plant. Diabetes was induced in Swiss albino mice with the administration of alloxan. At a dose of 100mg/kg the extract has shown significant decrease in blood sugar level when

compared to the alloxan induced diabetic mice. The antioxidant potential of the extract was also studies by using DPPH free radical scavenging activity and reducing property of ascorbic acid.

Abu Hassanat, *at al.*, (2011): studied the antioxidant potential of the *Ficus racemosa* fruit extract. Hypolipidemic activities of ethanolic extract *Ficus racemosa* bark extracts were studied in alloxan induced diabetic rats. Oral administration of FrEBet (300mg/kg bw) to diabetic rats restored the status of blood glucose, lipids and lipoproteins to near normal range. This investigation thus shows that FrEBet has potent antidiabetic and hypolipidemic effects in alloxan-induced diabetic rats and these effects were much comparable to that of the standard reference drug, glibenclamide`.

Faiyaz Ahmed, *et al.*, (2010) were studied the anticholinesterase activities of cold and hot aqueous extracts of *F. racemosa* stem bark. This study was evaluated the anticholinesterase activity of cold and hot aqueous extracts of *Ficus racemosa* stem bark against rat brain acetylcholinesterase *in vitro*. Both the cold aqueous extract and the hot aqueous extract exhibited a dose dependent inhibition of rat brain acetylcholinesterase.

Ahmed F *et al.*, (2009) were studied the glucose-lowering, Nephroprotective and hypolipidemic activities of stem bark of *Ficus racemosa* in streptozotocin-induced diabetic rats. The study was evaluated the antihyperglycemic, Nephroprotective, and hypolipidemic effects of *F. racemosa* bark powder and aqueous extract in streptozotocin-induced diabetic rats. Both the bark powderand aqueous extract of *F. racemosa* bark caused a significant reduction ($P \leq 0.05$) in blood glucose (54 and 66% respectively).

Ahmed F *et al.*, (2010) were reported the antibacterial activities of various sequential extracts of *Ficus racemosa* stem bark. The was study evaluated the antibacterial activity of sequential extracts of *Ficus racemosa* stem bark against *Staphylococcus aureus, Bacillus cereus, Pseudomonas aeruginosa, Escherichia coli* and *Bacillus subtilis* by disk-diffusion and agar- diffusion methods. In disk-diffusion assay chloroform, acetone and methanol extracts showed moderate antibacterial against *Staphylococcus aureus*, *Bacillus cereus*, *Bacillus subtilis* compared to the control,while petroleum ether extract did not exhibit antibacterial activity against any of the organisms tested.

Bhaskara Rao B et al., (2002) were evaluated the glucose-lowering efficacy of a methanol extract of the stem bark of *Ficus racemosa* Linn. both in normal and alloxan-induced diabetic rats. The doses examined (200 and 400 mg/kg p.o.) exhibited significant hypoglycaemic activity in both experimental animal models when compared with the control group.

Jaykaran et al., (2009) were studied the acute toxicity study of an aqueous extract of *Ficus racemosa* Linn. bark in albino mice. Albino mice of either sex were divided into four groups 1st group given plain water and 2nd,, 3rd, 4th given 100,300 and 1000mg of aqueous extract of herb per 100 gm body weight in single dose. After 72 h of dose blood sample taken to determine haemoglobin, RBC count, WBC count, blood urea, blood glucose, serum Creatinine, serum cholesterol, S.G.P.T and S.G.O.T. Result indicated that aqueous extract of *Ficus racemosa* did not have lethal effect upon 100 times of the therapeutic dose in albino mice.

Faiyaz Ahmed *et al.*, (2010) were found that the *Ficus racemosa* bark is a good source of dietary fiber, minerals, sugars and phenolic compounds. On dry basis, the total dietary fiber content was 20.5% of which major portion was contributed by insoluble dietary fiber (13.6%). Potassium was the most abundant mineral (11975 ppm) followed by chloride (7475 ppm) and calcium (1729 ppm). The bark was also a good source of other minerals and trace elements such as phosphorus and iron, zinc, magnesium, respectively.

Veerapur V.P. *et al.*, (2007) were reported the antioxidant activity of ethanol extract and water extract of *Ficus racemosa* bark. These extracts were subjected to free radical scavenging both by steady state and time resolved methods such as nanosecond pulse radiolysis and stopped-flow spectrophotometric analyses and based on the obtained results, concluded that the ethanol extract of *F. racemosa* acts as a potent antioxidant and a probable radioprotector.

Ahmed F. *et al.*, (2010) were studied the Nephroprotective effects of petroleum ether and methanol extract of *Ficus racemosa* Linn. stem bark. They were studied using the model of Nephrotoxicity induced by CCl_4 in rats. The CCl_4 administration induced a significant decrease in serum total protein, albumin, urea and a significant increase ($P \leq 0.01$) in total bilirubin associated with a marked elevation in the activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) as compared to control rats.

<<

Ranasooriya WD *et al.*, (2003) were reported the antidiuretic activity of the bark of *Ficus racemosa* Linn. The results demonstrated both the low- and

high-doses of bark decoction (D) and ADH significantly impaired the total urine output. The D-induced antidiuresis had a rapid onset (within 1 h), peaked at 3 h and lasted throughout the study period (5 h). However, antidiuretic potential of D was about 50% lower than that of ADH. The results provide scientific support for its claimed antidiuretic action and deserve intensive scrutiny.

Mohammed Safwan Ali Khan, *et al*., (2011) were evaluated the antiulcer activity of *Ficus raligiosa* against indomethacin and cold restrained stress-induced gastric ulcer and pylorus ligation assays. The extract (100, 200 and 400 mg/kg) significantly ($P<0.05$) reduced the ulcer index in all assays used. In conclusion, the present study provide preliminary data on the antiulcer potential of *F. religiosa* stem bark and support the traditional uses of the plant for the treatment of gastric ulcer.

Kaiser Hamid *et al.*, (2011) were evaluated the free radical scavenging activity of *Ficus racemosa* seeds using DPPH and brine shrimp lethality bioassay method. In both the methods, *Ficus racemosa* showed a significant activity.

DISCUSSION

Herbal medicine is globally accepted as a alternative system of therapy in the pharmaceuticals. But the drug delivery system for herbal drugs is quite traditional and out of date. An extensive research is going on in the area of novel drug delivery and targeting for plant actives and extracts. However, research in this area is still at the exploratory stage. A number of plant constituents like flavonoids, tannins, terpenoids etc. showed enhanced therapeutic effect at similar or less dose when incorporated into novel drug delivery vesicles as compared to conventional plant extracts. Hence, there is a need in development of novel drug delivery system for valuable herbal drugs as it provides efficient and economical drug delivery. Also, the trend of incorporating NDDS for herbal drugs has also been adopted at industrial scale.

REFERENCES

[1] Porter GA and Bennett WM. Nephrotoxic acute renal failure due to common drugs American journal of Physiology, 1981; 241(7): F1-F8.

[2] Hoitsma AJ, Wetzels JF and Koene RA. Drug induced nephrotoxicity. Aetiology, clinical features and management, Drug Saf, 1991; 6 (2): 131-147.

[3] Paller MS., Drug induced nephropathies Med Clin North Am, 1990; 74 (4): 909-917.

[4] http://farmacists.blogspot.com

[5] Herfindal, Gourley. Text book of therapeutic drug and disease management. 7th Edn. Charcil Livingstone, London; 2000; 425- 36.

[6] Barry M, Brenner, Floyd C, Rector. The kidney 6th Ed. Vol I, W. B. Saunders Company, Philadelphia; 2000; 3-67

[7] Schrier RW, Gottschalk CW. Disease of kidney, 5thed, 2, Published by Little Brown & Co, 1993; 1031-1165.

[8] Baumann, K and Hannemann. J. Toxicology, 1988; 51: 119- 132.

[9] Mora L. D., Antunes L. M., Francescato H. D., Bianchi M. del., The effects of oral glutamine on cisplatin-induced nephrotoxicity in rats. Pharmacol. Res. 2003; 47: 517–522

[10] Rao V, Arunachalam R, Madhavi Eerike a, Ramesh Rao K b, Arun Kumar Radhakrishnan a, Lakshmipathy Prabhu Raghuraman a, Vinayak Meti a, Sobita Devi, Nephroprotective effect of ethanolic extract of Azima tetracantha root in glycerol induced acute renal failure in Wistar albino rats. Journal of Traditional and Complementary Medicine. 2016; 6: 347- 354.

[11] Jude E. O., Paul A, Noah K. Nephroprotective effect of Croton zambesicus root extract against gentimicin-induced kidney injury. Asian Pacific Journal of Tropical Medicine. 2011; 10: 969-972.

[12] Patel M, Singh P. Nephroprotective effect of Murraya koenigii on cyclophosphamide induced nephrotoxicity in rats. Asian Pacific Journal of Tropical Medicine. 2017; 10(8): 808–812

[13] Rajakrishnan R, Lekshmi R, Benil C, Thomas J, AlFarhan A, Rakesh V, Khalaf S. Phytochemical evaluation of roots of Plumbago zeylanica L. and assessment of its potential as a nephroprotective agent, Saudi Journal of Biological Sciences. 2017; 24: 760–766.

[14] Kumar G, Karthik L, Rao B. Applied Botany. 2011; 40: 5534.

[15] Chatterjee P, Chakraborty B, NandyS. Review on nephroprotective activity study by different plant extract. Adv J Pharm Life sci Res. 2014; 2(2): 24-40

[16] Chandrashekhar CH, Latha KP, Vagdevi HM, Vaidya VP. Anthelmintic activity of the crude extracts of Ficus racemosa. Int J Green Pharm 2008; 2, 100-3

[17] Abu Hassanat Md. Zulfiker, Moni Rani Saha, Shammy Sarwar, Laizuman Nahar, Kaiser Hamid and Md. Sohel rana. Hypoglycemic and in vitro antioxidant activity of ethanolic extracts of Ficus racemosa Linn. Fruits. Am. J. Sci. Ind. Res. 2011; 2(3): 311-400

[18] Faiyaz Ahmed, Asna Urooj. Anticholinesterase activities of cold and hot aqueous extracts of F. racemosa stem bark. A publication of Phcog net. Pharmacognosy magazine. 2010; 6(22), 142-5

[19] Ahmed F, Urooj A. Glucose-lowering, Nephroprotective and hypolipidemic activities of stem bark of Ficus racemosa in streptozotocin-induced diabetic Rats. Journal of Young Pharmacists. 2009; 1(2), 160-4.

[20] Ahmed F, Urooj A. Antibacterial activities of various sequential extracts of Ficus racemosa stem bark. Pharmacognosy Journal. 2010; 2(8), 203-6.

[21] Bhaskara Rao B., et. al. Glucose lowering efficacy of Ficus racemosa bark extract in normal and alloxan diabetic rats. Phytotherapy Research. 2002; 16(6), 590-2

[22] Jaykaran, Pankaj Bhardwaj, N. D. Kantharia, Priti Yadav, and Arvind Panwar. Acute toxicity study of an aqueous extract of Ficus racemosa Linn. bark in albino mice. The Internet Journal of Toxicology. 2009; 6(1). 1-4.

[23] Faiyaz Ahmed, Asna Urooj. Anticholinesterase activities of cold and hot aqueous extracts of F. racemosa stem bark. A publication of Phcog net. Pharmacognosy magazine. 2010; 6(22), 142-5

[24] Veerapur V. P. et. al., *Ficus racemosa* Stem Bark Extract: A Potent Antioxidant and a Probable Natural Radioprotector. Advance Access Publication. 2007; 6(3), 317-24.

[25] Mohammed Safwan Ali Khan, Syed Ahmed Hussain, Abdul Manan Mat Jais, Zainul Amiruddin Zakaria and Mohib Khan. Anti-ulcer activity of *Ficus religiosa* stem bark ethanolic extract in rats. Anti-ulcer activity of *Ficus religiosa* stem bark ethanolic extract in rats. J. Med. Plants Res. 2011; 5(3), 354-9.

IJTSRD International Journal of Trend in Scientific Research and Development ISSN: 2456-6470