

**Review Article****Herbal Plants Used as Diuretics: A comprehensive Review****Koushik Nandan Dutta^{1*}, Purbajit Chetia¹, Sunita Lahkar¹, Sumit Das²**

¹Department of Pharmaceutical Science, Assam Down Town University, Panikhaiti, Guwahati-26, Assam, India

²Girijananda Chowdhury Institute of Pharmaceutical Science, Azara, Guwahati-17, Assam, India

* **Corresponding author:** Koushik Nandan Dutta **Email:** koushik5dutta@gmail.com

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ABSTRACT

Medicinal herbs are the significant source as Diuretics. Mono and poly-herbal preparations have been used as diuretics. According to one estimate, more than 650 mono and poly-herbal preparations in the form of decoction, tincture, tablets and capsules from more than 75 plants are in clinical use. There exist a large number of studies which supports the diuretic effects of traditional herbal medicines. This article reviews the various herbal plants used traditionally as diuretics and the identification of chemical constituent of the plant promoting diuresis. The present paper also involves various plant drugs and their pharmacological profile which focus on the dose administered, bioactive extract involved in diuresis mechanism. This work may mark an important milestone for the researchers in the selection of medicinal plant for carrying their work on diuretics.

Keywords: Diuretics, Herb, Extract, Pharmacological profile.

INTRODUCTION

Worldwide trend towards the utilization of natural plant remedies has created an enormous need for information about the properties and uses of the medicinal plant. The Indian Traditional Medicine like Ayurvedic, Siddha and

Unani are predominantly based on the use of plant materials. Herbal drugs have gained importance and popularity in recent years because of their safety, efficacy and cost effectiveness [1]. The association of medical plants with other plants in their habitat also influences their medicinal values in some cases.

One of the important and well -documented uses of plant -products is their use as Diuretic agents. Diuretic are commonly defined as drugs that increase the amount of urine output by the kidneys. These agents augment the renal excretion of sodium and either chloride or bicarbonate primarily, and water excretion secondarily[2].

MECHANISM OF ACTION OF DIURETICS

Diuretics play an important role in the management of oedema and hypertension. This function is mainly an increase in net negative

water and solute balance. The proximal convoluted tubule reabsorbs about 50-66 % of fluid by both active and passive processes. The thin descending limb of Loop of Henle allows osmotic water abstraction as it is highly permeable to water and impermeable to solutes. The reduced water absorption from the descending limb of Loop of Henle has an important role in over-all enhanced condition of diuresis. The thin ascending limb of Loop of Henle is impermeable to water and highly permeable to chloride and sodium therefore diuretics show no effects on it [3].

Table.1 Different types of diuretics [3]

Type		Example	Site of action	Mechanism
Carbonic anhydrase inhibitors		Acetazolamide	Proximal tubule	Inhibition of CA
Osmotic		Mannitol	Loop of Henle	Osmotic action
Loop diuretics		Furosemide	Loop of Henle	Inhibition of $\text{Na}^+ - \text{K}^+ - 2\text{Cl}^-$ symport
Thiazides		Hydrochlorothiazide	Distal convoluted tubule	Inhibition of $\text{Na}^+ - \text{Cl}^-$ symport
Potassium-sparing diuretics	Na ⁺ channel inhibitors	Triamterene, amiloride	Cortical collecting tubule	Inhibition of Na ⁺ channel
	Aldosterone antagonist	Spironolactone	Cortical collecting tubule	Inhibition of aldosterone receptor

HERBAL TREATMENT

Medicinal herbs are the significant source of Diuretics. Mono and poly-herbal preparations have been used as diuretics. According to one estimate, more than 650 mono and poly-herbal preparations in the form of decoction, tincture, tablets and capsules from more than 75 plants are in clinical use [4].

HERB USED AS A DIURETIC

Herb used as a diuretic has been used in India for a long time and has been popularized world over by leading pharmaceuticals. Plant medicine was commonly used for traditional treatment of some renal diseases and a lot of plants have been reported to show significant diuretic activity. Many investigators have demonstrated that studies of herbal plant used in traditional medicine as diuretics have increased recent years and might be a useful tool in the treatment of hypertension. Hypertension is considered one of

the main and dangerous complications of diabetes mellitus [5].

SOME HERBAL PLANTS EXERTING DIURETIC PROPERTY

Mangifera Indica

Mangifera indica is a species of mango in the Anacardiaceae family. It is found in the wild in India and cultivated varieties have been introduced to other warm regions of the world. It is the largest fruit-tree in the world, capable of a height of one-hundred feet and an average circumference of twelve to fourteen feet, sometimes reaching twenty [1].

Diuretic activity of *Mangifera indica* bark extract in rats was studied by Shree devi. They use Ethyl acetate, ethanol and water extract of *Mangifera indica* for evaluation of diuretic activity. Diuretic effect was carried out in rats (175 – 200 kg body wt.) by measuring the urine volume by 1, 2, 4, 6 hours and later at 24 hours. Positive control was supplied by furosemide (20mg/kg) i.p. and mannitol (100mg/kg) i.v. They administered the extract orally at the dose of 250 mg/kg body weight. Diuretic study revealed that Na⁺/ K⁺ ratio was higher in aqueous extract and followed by ethanol and ethyl acetate extracts. The aqueous extracts show best diuretic effect when compared with other extracts [6].

Mimosa pudica

Mimosa pudica also called sensitive plant, sleepy plant is a creeping annual or perennial herb often grown for its curiosity value: the compound leaves fold inward and droop when touched or shaken, to protect them from predators, re-opening minutes later. The species is native to South America and Central America. It grows mostly in shady areas, under trees or shrubs.

Diuretic test of aqueous extract of *Mimosa pudica* Linn. leaves were evaluated using Lipschitz test in normally fed albino rats. The control group was given 0.9% NaCl, the 3 test groups were treated

with aqueous extract of leaves of *M. pudica* in the doses of 100, 200 and 400 mg/kg respectively, and the standard group received furosemide. Urine biochemical analysis was done by colorimetry. The aqueous extract of *M. pudica* leaves at 100 mg/kg p.o. showed significant diuretic activity with increased electrolytes excretion ($P < 0.01$ for urine output, $P < 0.01$ for Cl⁻, $P < 0.05$ for K⁺ and $P < 0.01$ for Na⁺). Increasing the dose of the test drug, however, does not bring about increase in diuretic property [7].

Lepidium sativum

Lepidium sativum known as garden cress belongs to the family Brassicaceae. The seeds and leaves of the plant contain volatile oils. Garden cress seeds are bitter, thermogenic, depurative, rubefacient, galactagogue, tonic, aphrodisiac, ophthalmic, antiscorbutic, antihistaminic and diuretic. They are useful in the treatment of asthma, coughs with expectoration, poultices for sprains, leprosy, skin disease, dysentery, diarrhoea, splenomegaly, dyspepsia, lumbago, leucorrhoea, scurvy and seminal weakness. Seeds have been shown to reduce the symptoms of asthma and improve lung function in asthmatics. The main chemical constituents of *L. sativum* are flavonoids, coumarins, glycosides, glucosinolate, glucotropaeolin, triterpenes, sterols and alkaloids [8].

Urine volume was significantly increased by aqueous and methanolic extracts of the drug *L. sativum*. The aqueous and methanolic extracts of the plant increases the sodium excretion whereas the excretion of potassium is increased by aqueous extract only. The diuretic effect of the extracts was equivalent to that of the hydrochlorothiazide which is used as reference drug and methanol had the supplementary benefit of a potassium conserving effect [9].

Achyranthes aspera

Achyranthes aspera Linn (Amaranthaceae), commonly known as Apamarga in Ayurveda and is

found as a weed that has been traditionally used for a number of ailments. The plant is indigenously used as diuretic, spermicidal, anti-allergic, cardiovascular, nephroprotective, antiparasitic, hypoglycaemic, analgesic and antipyretic. In the present study the methanolic extract of whole plant of *Achyranthes aspera* was investigated for its diuretic potential. The diuretic effect was found out by Lipschitz et. al. method using furosemide as standard drug. The methanolic extract treated rats showed high diuretic effect as compared to control but this effect was less than furosemide. Significant increase in renal clearance of sodium, potassium and chloride ions was observed in treated and standard groups [10].

Bixa orellana

Bixa Orellana is a shrub or small tree widely cultivated for the seeds or as an ornamental in West Indies, tropical Asia and Africa. The plant has long been used by American Indians to make body paint, especially for the lips, which is the origin of the plant's nickname, lipstick tree. Extracts of the leaves of *bixa* possess antimicrobial activity against Gram positive microorganisms, with maximum activity against *Bacillus pumilus* [11]. *Bixa* leaves have been employed to treat malaria and Leishmaniasis. The dried leaf powder was subjected to successive soxhlet extraction with Petroleum ether, Methanol and water. These extracts were investigated for diuretic activity in wister rats using standard method. The methanolic extract of *Bixa orellana* leaves possess significant diuretic activity by increasing the total urine output and increased excretion of sodium, potassium and chloride level [12].

Euphorbia thymifolia

Euphorbia thymifolia (*Euphorbiaceae*) is a small branched, pubescent, prostrate annual herb, commonly known as *laghududhika* or *choti-dudhi*. The leaves, seeds and fresh juice of whole plant are used in worm infections, as stimulant, astringent. Kane S R et. al. investigated the

diuretic activity of crude ethanolic extract and fractions of *Euphorbia Thymifolia linn* in albino rats and was compared with standard drugs Furosemide (10mg/kg,p.o.). Fractions of the extract potentiated the diuretic activity with respect to the standard drug. The activities may be contributed by the phytoconstituents present in ethanolic extract of *Euphorbia Thymifolia Linn*. [13]

Taraxacum officinale

Taraxacum officinale, the common dandelion (often called "dandelion"), is a flowering herbaceous perennial plant of the family Asteraceae. Dandelion is commonly used as a food. The leaves are used in salads and teas, while the roots are sometimes used as a coffee substitute. Dandelion leaves and roots have been used for hundreds of years to treat liver, gallbladder, kidney, and joint problems [14]. Dandelion is traditionally considered as an alternative for conditions such as eczema and cancer. In experimental research on mice, high amounts of an aqueous extract of dandelion leaf (2 gm per kg body wt.) have been shown to have diuretic activity comparable to furosemide. Since dandelion is also a rich source of potassium, some researchers think that it is capable of replacing potassium lost through diuresis [15].

Allium sativum

Allium sativum, commonly known as garlic, belongs to the family Liliaceae and genus *Allium*. Garlic is used as carminative, a prodisic, expectorant and disinfectant in the treatment of pulmonary conditions. Oil of garlic is used as anthelmintic and rubefacient. It has been noticed that garlic lowered the blood pressure and level of cholesterol and also possesses strong antimicrobial activity. The intravenous administration of purified fractions of *Allium sativum*, exhibits a significant biphasic and natriuretic response. Chloride ions follow the natriuretic profile but potassium ions do not. No changes were observed

in arterial blood pressure or in the electrocardiogram. The purified garlic fractions also bring about a suppressive dose dependent effect on Na⁺-K⁺-ATPase. Therefore it may cause diuresis by increasing the volume of urine [16].

CONCLUSION

The current review is intended to provide an overview of the current knowledge surrounding the use of herbal medicines as diuretics. In modern day to day practice diuretics can be used as a first line therapy in hypertensive patients. Herbal medicines are in great demand in the developed as well as in the developing countries for primary health care because of their wide biological and medicinal activities, higher safety margins and lesser costs. The review has included the botanical characteristics of the plant which helps in identification of the plant, Ethnobotany which give traditional use of the plant, and the reported activities of the plant. However, the number of studies is limited and we recommend that further studies to be conducted to confirm reported activities. Such evidence is needed to provide scientific credence to the folklore use of traditional medicines and even be helpful in the development of future medicines and treatments and treatment guidelines. By this review, it can be concluded that in the core of the nature there are so many plants which possess potent diuretic activity. Herbal medications are free from side effects and toxicity unlike the allopathic medicines. The current review projected to provide an overview of knowledge adjoining the herbal medicines used as diuretics.

REFERENCES

1. Chauhan C et al. Germination, emergence, and dormancy of *Mimosa pudica*. *Weed Biology and Management* 2009; 9(1): 38–45.
2. Barrar FSK. *Text book of pharmacology*. New Delhi: S. Chand; 2003, p298.
3. Kokko P J. Site and mechanism of action of diuretics. *American Journal of Medicine* 1984; 77: 11-17.
4. Chopra RN, Nayar SL, Chopra, LC. *Glossary of Indian Medicinal Plants (Including the supplement)*. New Delhi, India: Council of Scientific and Industrial Research; 1986, p 845.
5. Wright C J et al. Herbal medicines as diuretics, a review of the scientific evidence. *Journal of Ethnopharmacology* 2007; 114(1):1-31.
6. Shree Devi MS. Acute toxicity and diuretic activity of *Mangifera indica* Linn bark extracts. *International Journal of Pharma and Bio sciences* 2011; 2(3):141-146.
7. Sangmai T K et al. Diuretic property of aqueous extract of leaves of *Mimosa pudica* Linn on experimental albino rats. *Journal of Natural Product* 2010; 3:173-178.
8. Archana N P, Anita A M. A study on clinical efficacy of *Lepidium sativum* seeds in treatment of bronchial asthma. *Iranian Journal of Pharmacology and Therapeutics* 2006; 5: 55–59.
9. Patel U et al. Evaluation of diuretic activity of aqueous and methanol extracts of *Lepidium sativum* Garden Cress (Cruciferae) in Rats. *Tropical Journal of Pharmaceutical Research* 2009; 8:215-219.
10. Srivastav S et al. Diuretic activity of whole plant extract of *Achyranthes aspera* Linn. *European Journal of Experimental Biology* 2011; 1(2):97-102.
11. Fleischer T C et al. Antimicrobial activity of the leaves and seeds of *Bixa orellana*. *Fitoterapia* 2003; 74 (1–2): 136–138.
12. Radhika B et al. Diuretic activity of *Bixa orellana* Linn leaf extracts. *Indian journal of Natural Products and Resources* 2010; 1(3):353-355.
13. Kane S R et al. Diuretic and laxative activity of ethanolic extract and its fractions of *Euphorbia Thymifolia* Linn. *International Journal of Chem Tech Research* 2009; 1(2):149 -152.
14. Blumenthal M, Goldberg A, Brinckmann J. *Herbal Medicine: Expanded Commission E Monographs*. Newton, MA: Integrative Medicine Communications; 2000, p78.
15. Racz-KE et al. The action of *Taraxacum officinale* extracts on the body weight and

- diuresis of laboratory animals. *Planta Medica* 1974; 26:212-217.
16. Pantoja C V et al. Purification and bioassays of a Diuretic and natriuretic fraction from garlic (*Allium sativum*). *Journal of Ethnopharmacology* 2000; 70: 35-40.