



Potential Diuretic Herbal Medicinal Plants: A Critical Review

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Abstract: There is increasing interest in the herbs and botanicals for the benefit of health and wellness. Diuretics are the drugs used in the treatment of various disorders like hypertension, cardiovascular disorders and liver degeneration diseases, renal disorders, ascites, generalised oedema of the body etc. Diuretics are used to lower blood pressure and work by increasing the excretion of urine from the body as well as the amount of sodium in urine. We recognised a number of species and genres of herbal plants having diuretic effects. The aim of this review is to highlight the work on diuretic action of herbal drugs. The selection of papers was made using the most relevant databases for the biomedical sciences on the basis of their traditional use. The numerous diuretic herbs with their active phytoconstituents have been explored in ancient literature for the benefit of human beings. The present paper also involves various plant drugs and their pharmacological profiles which focus on the various formulations, bioactive extract involved in diuretic mechanism. This study may be helpful in the selection of medicinal herbs/plant for carrying their research work on the diuretics.

Keywords: Herbal medicine, Traditional; Natural; Diuretic, Generalised edema, Phytoconstituents, Pharmacology etc.

Introduction:

There has been an increase demand for the pharmaceutical products from the natural origin in all over the world because of their lesser side effects as compare with the modern system of medicine ⁽¹⁾. Ayurvedic system of medicine is widely practiced and accepted by peoples not only in India but also in the developed countries such as USA, Europe, China, Japan, Canada etc. According to World Health Organisation (WHO) nearly 80 % of the global population still rely upon the herbal drugs for their primary health care ⁽²⁾. The Indian Traditional Medicine like Ayurvedic, Siddha and Unani are predominantly based on the use of natural sources like plant materials etc. Herbal drugs have gained importance and popularity in recent years because of their safety, efficacy and cost effectiveness. 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. Medicinal herbs are the significant source of diuretics. Mono and poly-herbal preparations have been used as diuretics from ancient times. 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 ⁽³⁾.

Diuretic activity:

Drug induced increased urine flow is called as diuretic which is used to adjust the volume and composition of body fluid in various disorder including hypertension, nephritic syndrome, cirrhosis, renal failure, heart failure, and pregnancy toxemia⁽⁴⁾. Administrations of modern diuretic drugs (Allopathic drugs) have many unavoidable adverse side-effects. So there is need for the development of newer diuretic agent/formulations with therapeutic efficacy and free from side effects for this herbal drugs are the best option.

Mechanism of action for diuretics:

Diuretic drugs act by diminishing sodium reabsorption at different sites in the nephron, thereby increasing urinary sodium and water losses. A second class of diuretics, sometimes termed aquaretics, instead inhibit water reabsorption by blocking vasopressin receptors along the connecting tubule and collecting duct. Herbal diuretic drugs play significant role in the management of oedema and hypertension, cirrhosis of liver etc. Diuretic function is mainly an increase in net negative water and solute from body. The proximal convoluted tubule (PCT) reabsorbs about 50-66 % of fluid by both active and passive processes.

Table 1: List of some Indian medicinal Plants used as Diuretics

Sr. No.	Plant name/ family	Geographic distribution	Part used	Ayurvedic name	Chemical constituents	Other biological activities
1.	Abutilon indicum/ Malvaceae ⁽⁵⁾	Throughout the tropical parts of India	Whole plant	Atibalaa	Mucilage, tannins, asparagines, gallic acid sesquiterpene alkaloids, flavonoids, sterols, triterpenoids, saponins, cardiac glycosides	Febrifuge, anthelmintic, demulcent
2.	Acacia suma, Mimosacea	West Bengal, Bihar, western Peninsula	Wood	Shveta khadira	Tannins, catechin phlobatannin	Antidiarrhoeal, haemostatic
3.	Achyranthes aspera, Amaranthaceae ⁽⁶⁾	Temperate and subtropical Himalayas from Kishtwar to Sikkim	Seeds, root	Apaama arg	Oligosaccharide, Steroids, triterpenoids, alkaloids, coumarins	Antimicrobial
4.	Aerva lanata, Amaranthaceae ⁽⁷⁾	Tropical parts of India	Entire plant	Paashaa nab-heda	Palmitic acid, β -sitosterol, alpha- amyryn, alkaloids	Demulcent, anthelmintic, antidiarrhoeal
5.	Allium sativum, Liliaceae ⁽⁸⁾	Native to Central Asia and cultivated throughout	Bulbs	Lashuna	Sulphur containing amino acids known as alliin	Antibiotic, bacteriostatic, fungicide, anthelmintic, hypotensive

		India				
6.	Terminalia arjuna, Combretaceae	Throughout India	Bark, leaves	Arjuna	Arjunolic acid, terminic acid, glycosides (arjunetin, arjunosides I– IV), and strong antioxidants, flavones, tannins, oligomeric proanthocyanidi ns	Cardiotonic in angina and employed in poor coronary circulation
7.	Benincasa hispida, Cucurbitaceae	Cultivated largely in Uttar Pradesh, Punjab, Rajasthan and Bihar	Roots, leaves, fruits	Kuushm aanda	Pentacyclic triterpene	Cooling, treatment of skin bruises
8.	Boerhaavia diffusa, Nyctaginaceae ⁽⁹⁾	Throughout India	As a weed Roots	Punarna vaa	Xanthone,β- ecdysone, flavonoid	Arbinofuranosid e antifibrinolytic
9.	Capparis spinosa, Cappariadaceae	Rajasthan, Peninsular India	Bark, flower	Himsraa	Glucosinolates- glucoiberin, glucocapparin, sinigrin, glucocleomin, glucocapangatin	Antiinflammator y, deobstruent to liver and spleen
10.	Daucus carota, Umbelliferae	Punjab, Haryana, Uttar Pradesh and Madhya Pradesh	Roots, seeds	Gaajara	Flavones- apigenin, chypsin, luteolin, flavonols- kaempferol, quercetin, furanocoumarin s, methoxypsorale n	Hepatoprotective
11	Cichorium intybus, Compositae ⁽¹⁰⁾	North West India, Tamil Nadu and parts of Andhra Pradesh	Entire herb	Kaasani	Citric and tartaric acids, acetic, lactic, pyruvic, pyromucic, palmitic and tartaric acids	Laxative, cholagogue, mild hepatic
12	Cocos nucifera, Palmae	Kerala, Tamil Nadu, Karnataka	Fruit, husk	Naarikel a	Reducing sugars	Stomachic, laxative
13	Moringa oleifera, Moringaceae ⁽¹¹⁾	Punjab	Fruits, leaves, flowers,	Shigru	Nitrile glycosides, niazirin	Cholagogue, stimulant

			bark		niazirinin	
14	<i>Cuscuta reflexa</i> , Convolvulaceae ⁽¹²⁾	A parasitic climber common throughout India	Entire plant	Amarvali	Amarbelin and Kaempferol, cuscutin, cuscutatin, β -sitosterol, luteolin, bergenin kaempferol, alkaloids	Carminative
15	<i>Zea mays</i> , Gramineae ⁽¹³⁾	Food crop mainly in Uttar Pradesh, Madhya Pradesh, Bihar	Leaves, fruits	Mahaa-Kaaya	Saponins, allantoin, β -sitosterol, glycoprotein	Antiviral
16	<i>Tribulus terrestris</i> , Zygophyllaceae ^(14 & 15) ,	Throughout India up to 5400 m	Fruits	Gokshura	Sapogenins, diosgenin, chlorogenin, ruscogenin	Demulcent, anabolic anti-inflammatory
17	<i>Asparagus racemosus</i> , Asparagaceae ⁽¹⁶⁾	Tropical, subtropical parts of India	Roots, leaves	Shataavari	Saponins (shatavarins I–IV)	Sexual debility for spermatogenesis
18	<i>Euphorbia thymifolia</i> , Euphorbiaceae ⁽¹⁷⁾	Tropical plains, lower hills of India	Leaves, seeds	Dudhi	Epitaraxerol, n-hexacosanol, euphorbol	Antispasmodic, bronchodilator antiasthmatic

Phytochemistry of diuretic plants:

Wide range of phytoconstituents is responsible for diuretic activity includes phenolics, coumarins alkaloids, glycosides, tannins, triterpenoids etc. These phytoconstituents present in plant exert anticipated pharmacological effect on body and thus act as natural diuretic. Phenolics (flavanoids and tannins) of *Terminalia arjuna*, *Cuscuta reflexa*, *Mimusops elengi*; alkaloids of *Aerva lanata*; coumarins of *Daucus carota*; triterpenes of *Abutilon indicum*; saponins of *Asparagus racemosus*, *Tribulus terrestris*; glycosides of *Moringa oleifera* might be involved in the mechanism of diuretic activity.

Pharmacological activities: Natural diuretic acts by increasing the urine output as well as urinary electrolyte concentration. *Costus speciosus*, *Tylophora indica*, *Phyllanthus fraternus*, increases the sodium and potassium ion concentration in urine. *Tribulus alatus* acts as loop diuretics and *Rungia repens* might causes risk of hypokalemia due increased excretion of potassium level in urine. There are many Indian medicinal plants reported for their remarkable diuretic activity, details have been provided below.

Some herbal/medicinal plants reported for their diuretic activity (Table-2.)

S.No.	Plant/family	Extract name	Dose (mg/kg)	Diuretic action
1.	<i>Tylophora indica</i> , Asclepiadaceae ^(18 & 19)	Aqueous, alcoholic	100	Urine volume, cation, anion concentrations significantly increased
2.	<i>Costus speciosus</i> ,	Aqueous,	250	Significantly increases the urine output as

	Zingiberaceae ⁽²⁰⁾	alcoholic		well as urinary electrolyte concentration
3.	Tribulus terrestris, Zygophyllaceae ^(21&22)	Aqueous	500	Loop diuretics increased urinary water and electrolytes excretion
4.	Phyllanthus fraternus, Euphorbiaceae ⁽²³⁾	Methanol	100, 200	Increase in volume of urine and urinary Na + , K + and Cl - ionic concentrations
5.	Mimosa pudica, Mimosaceae ⁽²⁴⁾	Aqueous	100, 200, 400	Extract showed significant diuretic activity with increased electrolytes excretion
6.	Lepidium sativum, Curciferace (25)	Aqueous, alcoholic	50, 100	Excretion of sodium was increased, potassium excretion was only increased by the aqueous extract

Discussion:

India has biggest repository of medicinal plants in the world production of raw materials either directly for crude drugs or as the bioactive compounds in the formulation of pharmaceuticals. There is variation in climate, soil, altitude and latitude. Diuretic agents have very wide application in the treatment of various diseases associated with edema, hypertension, congestive heart failure, glaucoma, diabetes insipidus and liver ailments. There is large number of Indian medicinal plants exhibiting diuretic effect like Boerhaavia diffusa, Cocos nucifera, Tribulus terrestris etc.

Conclusion:

Herbal plants are good source of various biologically active phytoconstituents like alkaloids, flavonoids, triterpenes etc. These phytoconstituents used as therapeutic agents as well as source of material for the synthesis of pharmacologically active compounds. In the present paper an attempt has been made to provide a collective knowledge on therapeutic, pharmacological, phytochemical knowledge for medicinal applications of herbal plants. 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 and generalised oedema 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 current review projected to provide an overview of knowledge adjoining the herbal medicines used as diuretics. This collective knowledge of diuretic herbal drugs would encourage the research scholar for further researches so that a better outcome will derive, which can compete with the other systems of medicine.

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