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HERBAL DRUGS USED AS DIURETICS

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ABSTRACT

There is rising interest of herbal drugs in the health and their benefits. The beneficial reason is that they might offer a natural safeguard against the development of certain conditions and be a reputed treatment for some diseases or ailments. One such area may be the lowering of the blood pressure in elevated (hypertension) patient. One major class of clinical medicines that are used to lower the blood pressure are known as diuretics and they work by increasing the volume of urinary excretion as well as the amount of sodium in urine from our body. There are a large number of studies which supports the diuretic effects of traditional herbal medicines. This article reviews the various herbal drugs used traditionally as diuretics and identify which chemical constituent of the plant promotes diuresis. We review many species and genres which show diuretic activity.

Keywords: Medicine; Traditional; Diuretic; Natural.

INTRODUCTION

At the present time, the practice of using herbal drugs has become main stream throughout the world. These herbal preparations are considered moderate in efficacy and are less toxic than the most commonly used pharmaceutical drugs ^[1].

Herbal diuretics are used to increase the excretion of water and sodium from the body as a part of treatment plan for the people suffering from high blood pressure, heart problems, and certain kidney diseases. These herbal diuretics can be used along with or in place of drugs which are prescribed by a doctor. There are no side effects of these herbs ^[2].

SITE AND MECHANISM OF ACTION

Diuretics bring about significant changes in patients suffering from CHF but they facilitate the renin-angiotensin system. Stimulation of this renin-angiotensin coordination in temperate heart failure occurs as a comeback to diuretic treatment rather than as a result of the disease process itself ^[3].

Diuretics play an important role in the management of edema 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 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 ^[4].

CONDITIONS IN WHICH DIURETICS MAY BE EFFECTIVE

High Blood Pressure (Hypertension), Edema, Weight Loss, Diabetes Insipidus, congestive heart failure, Kidney Disease, Water Retention, Glaucoma, Liver Disease, Urinary Tract Infection, Osteoporosis.

The physicians and dietitians should be encouraged for promotion and inspection of the fluid and also the water intake among all of their patients through education and to help them design a fluid intake plan ^[5].

ADVERSE EFFECTS OF SYNTHETIC DIURETICS

The main adverse effects of diuretics are hypokalaemia, hypomagnesaemia, hypercholesterolaemia, hyperglycaemia with aggravation of diabetes as well as the nonketotic hyperglycaemic syndrome. Diuretic also causes adverse effects on quality of life which includes impotence, fatigue and weakness ^[6].

DIURETIC EFFECT OF THAI INDIGENOUS PLANTS

Extracts of some indigenous Thai medicinal plant which were used in the management of dysuria were found for their diuretic activity. Root extract of plants like *Ananas comosus* and *Carica papaya* gave similar effect of excretion of urinary electrolytes to that of the standard drug. The determination of the osmolality of urine and electrolyte per unit time suggests that the *A. comosus* shows intrinsic diuretic activity, on the other hand the extracts of *C. papaya* exhibit effects due to its high salt content ^[7].

DIURETIC ACTIVITY OF SOME HERBAL PLANTS

1. Diuretic activity of *Petroselinum crispum* (Parsley)

Parsley plant belongs to the family Umbelliferae. Its main chemical constituent flavone glycosides are synthesized in the presence of ultraviolet radiation ^[8].

Parsley exhibits its diuretic activity by the inhibition of the $\text{Na}^+ - \text{K}^+$ ATPase pump which ultimately results in decrease in the $\text{Na}^+ - \text{K}^+$ reabsorption. Finally osmotic water flows into the lumen and causes diuresis ^[9].

2. Diuretic activity of *Retama raetam*

Retama raetam (RR) commonly named as “R'tm” is an indigenous plant belonging to the family Fabaceae. The extracts of the plant contains polyphenols, flavonoids, and tannins as chemical constituent ^[10].

The drug was widely used in the diabetes phytotherapy in Tafilalet region. It increases the diuresis with an elevation of glomerular filtration rate and a significant decrease of urinary osmolarity. Despite this, the extracts of this plant did not affect the plasma urea levels, urine pH, and plasma osmolarity and hematocrite level. Therefore, the water extract of the aerial parts of RR displays an expressive diuretic effect ^[11].

3. Diuretic activity of *Allium sativum*

Allium sativum, commonly known as garlic, belongs to the family Liliaceae and genus *Allium*. It is used as an anti-hypertensive, anti-rheumatic and stimulant, and also in the management of various diseases like asthma, diabetes, cold, paralysis, forgetfulness, tremor colic pain and chronic fever. It has been noticed that garlic lowered the blood pressure and level of cholesterol and also possesses strong anti-microbial activity ^[12].

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 ^[13].

4. Diuretic activity of *Lepidium sativum*

Lepidium sativum known as pepper cress belongs to the family Brassicaceae (cruciferae). The seeds and leaves of the plant contain volatile oils. The plant is eaten and seed oils are used in the treatment of dysentery and diarrhea. It has also been reported to treat migraine ^[14].

The main chemical constituents of *L. sativum* are flavonoids, coumarins, glycosides, glucosinolate, glucotropaeolin, triterpenes, sterols and alkaloids ^[15].

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 ^[16].

5. Diuretic activity of *Cichorium intybus*

Cichorium intybus or chicory exist in the Asteraceae family and is a small aromatic biennial or perennial herb. The entire plant of the chicory contains so many medicinally useful components such as inulin, esculin, monoterpenes and sesquiterpenes, coumarins, flavonoids and vitamins ^[17].

The oral administration of herbal mixture of root and seed of *Cichorium intybus* results in increase in diuresis with significant increase in sodium and chloride excretion as compared with the standard drug, Furosemide ^[18].

6. Diuretic activity of *Carissa edulis*

Carissa edulis is a member of family Apocynaceae and it is used conventionally as diuretic and also for the management of headache, chest complaints, rheumatism, gonorrhoea, syphilis and rabies. Different extracts of the plant *Carissa edulis* exhibit diuretic effect. The maceration extract of the root bark shows no effect on the urine volume, whereas the root bark soxhlet extract showed a considerable increase in urine volume and enhances the elimination of sodium, potassium and chloride ions; maceration extract of the root wood increases sodium and potassium excretion, while root wood soxhlet extract increases the elimination of potassium ions only. This supports the conventional utilization of *Carissa edulis* as a diuretic agent ^[19].

7. Diuretic activity of *Taraxacum officinale*

Taraxacum officinale (dandelion) belongs to the Asteraceae family. The leaves and roots of dandelion have been utilized from many years for the management of problems related to kidney, gallbladder, liver and joint. Dandelion root contains an abundance of sesquiterpenes: eudesmanolide, guainolide, etc. It also contains various triterpenes like taraxasterol, phytosterols such as -sitosterol, several phenolic

compounds, eg- dicaffeoltartaric, chlorogenic, caffeic, p-coumaric, etc and flavonoids like apigenin. The dandelion root is a rich source of inulin ^[20].

In some animals, dandelion leaf extracts had diuretic effect as much effective as Furosemide. Dandelion has superior diuretic property than other herbal drugs like horsetail and juniper berry. But there are no facts estimating the diuretic effects of the dandelion leaves or roots in humans comparing it to standard diuretic medication ^[21].

8. Diuretic activity of *Nyctanthus Arbo-Tristis*

Nyctanthus arbotristis Linn is an herb which belongs to the family Oleaceae. The juice of the leaf of the herb is utilized in the treatment of loss of appetite, piles, liver diseases, chronic fever, intestinal worms, biliary disorders, rheumatism and fever with rigors ^[22]. The diuretic activity of the plant *Nyctanthus arbotristis* is determined by using the hot water infusion of flowers of plant. The hot water flower infusion induced a significant diuresis. The onset of the diuretic action was very rapid (within one hour). This flower infusion causes a considerable impairment of the urinary sodium and potassium levels and caused a slight but significant alkalization. But, it had no effect on specific gravity of urine or sodium potassium ratio of urine. Therefore, this infusion induced diuresis by acting as a potassium sparing diuretic. Hence the flowers of *Nyctanthus arbotristis* may use as a secure, efficient and economical diuretic ^[23].

9. Diuretic activity of *Elettaria cardamom*

Elettaria cardamomum Maton or cardamom belongs to the family Scitamineae. Its common name is "elaichi" and is a perennial herb, indigenous to India, Pakistan, Burma and Sri Lanka. It is widely used for cooking purpose and also as diuretic, carminative, stomachic, abortifacient, antibacterial, antiviral and antifungal. It is also beneficial in the management of constipation, colic pain, diarrhea, dyspepsia, vomiting, headache, epilepsy and heart related diseases. The main constituents of cardamom are: -terpineol, myrcene, heptanes, subinene, limonene, cineol, -phellandrene, menthone, -pinene, -pinene, linalol, nerolidol, -sitostenone, -sitosterol, phytol, bisabolene, borneol, citronellol, p-cymene, geraniol, geranyl acetate, stigmasterol and terpinene. The diuretic effect of cardamom is approved by increasing the urine volume (diuresis). In parallel with increase in the volume of urine, it also enhances the urinary excretion of Na⁺ and K⁺ similar to that caused by a standard diuretic furosemide.

Loop diuretics in addition to enhance the urinary outflow are also known to strongly improve the elimination of urinary electrolyte and are considered as saluretic. Diuretics are usually prescribed in addition with the antihypertensive agents for the control and treatment of moderate to rigorous hypertension and the existence of diuretic constituents are likely to complement the BP-lowering activity of the cardamom ^[24].

10. Diuretic activity of *Tropaeolum majus*

Tropaeolum majus L. belonging to family Tropaeolaceae and is traditionally known as “chaguinha”. It is well renowned in Brazilian conventional medicine as diuretic agent, though no scientific information has been published to maintain the diuretic activity of the herb. The infusions of *Tropaeolum majus* did not exhibit a considerable effect on urine volume, but its higher concentration shows a significant rise in excretion of sodium. *Tropaeolum majus* enhances acute diuresis and increases excretion of sodium from urine and does not interfere with the potassium excretion. *Tropaeolum majus* could be a capable herbal diuretic drug with low toxicity ^[25].

11. Diuretic activity of *Erica multiflora* and *Cynodon dactylon*

Erica multiflora belongs to the family Ericaceae and *Cynodon dactylon* belongs to the family Poaceae. The Plant extracts enhances significantly the output of urine and electrolytes excretion. The urinary flow rate and urinary excretion of sodium, potassium and chloride increases by inhibiting $\text{Na}^+ - \text{K}^+ - 2\text{Cl}^-$ symporter (co-transporter system) in the thick ascending limb of loop of Henle ^[26].

12. Diuretic activity of *Carum carvi* and *Tanacetum vulgare*

The ripe fruits of the plant *Carum carvi* L. belongs to the family Apiaceae and the leaves of the plant *Tanacetum vulgare* L. belonging to the family Asteraceae/Compositae, are two broadly obtained plant products which are used as diuretics. The water extracts of both the plants increases the urine output. Both the extract increases urinary levels of Na^+ and K^+ , while the drug furosemide increases the urinary levels of only Na^+ and decreases urinary K^+ . The mechanism of action of the extracts is similar to that of furosemide, a high-ceiling loop diuretic hydrochlorothiazide ^[27].

13. Diuretic activity of Jawarish Zarooni Sada (a Unani herb)

Jawarish Zarooni Sada (JZS) is a polyherbal preparation which contains 15 ingredients, mostly explained to be diuretic and nephroprotective. This herbal preparation

produced a striking increase in total urine output and also increases the excretion of sodium and potassium significantly. For this reason JZS has been shown to acquire important diuretic activities, natriuretic effects, and kaliuretic effects on the basis of its therapeutic use in a variety of renal diseases, such as nephritis, burning micturition and some oedematous ailments. The diuretic activity of JZS has been shown approximately equal to that of furosemide ^[28].

14. Diuretic activity of *Rumex abyssinicus*

The herb *Rumex abyssinicus* belongs to the family Polygonaceae. It has been used conventionally for the management of hypertension, inflammatory and painful conditions in Ethiopia. The aqueous and 80% methanolic extracts of the drug shows a clear and significant dose-dependent diuresis. The methanolic extract produces better diuretic effect than the aqueous extracts. The effect of both aqueous and methanolic extracts of *Rumex abyssinicus* on diuresis was accompanied by marked increase in urinary Na⁺, K⁺ and Cl⁻. The higher doses of aqueous and hydroalcoholic extracts of rhizome, establishes electrolyte and water excretion qualitatively comparable to that of the furosemide. Therefore the extracts of *Rumex abyssinicus* exhibit their diuretic effect by suppressing the tubular reabsorption of water and accompanying ions ^[29].

CONCLUSION

In conclusion, it could be stated that diuretics continue to be a good modern day option for lowering blood pressure; hence they can be used as first line therapy in hypertensive patient. There are various plant species, whose plant part exhibit promising diuretic activity. Most of plant mentioned in this article contains flavonoids and steroidal compounds. It may be advised that these substances might be responsible for the diuretic activity. They enhance the volume of urine and urinary sodium excretion as efficiently as a potent standard diuretic with few or no side effects. For this reason, these plants are traditionally used as diuretics throughout the world since long time.

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