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Ethnobotany and Diuretic activity of some selected medicinal plants

Nikita Jaiswal[*1], Shipra Singh[1], Garima Verma[1]

1. SS Ayurvedic Medical College, Haveri, Karnataka-581110

Abstract: There is growing interest in the health benefits of herbs and botanicals. In line with this there are an increasing number of published articles claiming that plants or plant-derived actives may function as mild diuretic agents. Diuretics are substances that act within the kidney and promote the loss of fluid from the body. A large majority of this research has determined the degree of clinical support for the traditional use of common or folklore medicines.

Keywords: Plant, Ethnobotany, Diuretic activity, Family

Introduction:

Diuretics are substances that act within the kidney and promote the loss of fluid from the body. To be clinically effective, however, such compounds must induce the loss of sodium. This is achieved by compounds interfering with the reabsorption of ions, as well as water, through the walls of the kidney tubules and this promotes their excretion from the body. Diuretics work by promoting the expulsion of urine (measured as the urine volume [UV] excreted) and urinary sodium (UNa) from the body and this helps reduce the volume of blood circulating through the cardiovascular system. A large majority of this research has determined the degree of clinical support for the traditional use of common or folklore medicines.

Allium sativum: Alliaceae

Allium sativum is a perennial herb and grows top a length of roughly two feet (Grover et al., 2002). The bulb is the part used in traditional medicine and consists of between 4 and 20 cloves. Originally it

comes from central Asia, but is now cultivated throughout the world.

Ethnobotany-

Allium sativum is commonly used as a flavouring agent and has been used as a traditional medicine for thousands of years.[1] Its main active is allicin, which is responsible for its characteristic smell and has been used for its anti-bacterial properties.[2] Allium sativum is reputed to offer protection against strokes, coronary thrombosis, atherosclerosis and platelet aggregation, and work as an anti-hypertensive, anti-hyperglycaemic and anti-hyperlipidemic agent.[3-7]

Diuretic activity-

Five studies have tested the diuretic effect of Allium sativum.[3-7] Pantoja et al. has performed three trials in anaesthetized animals.[5-7] The first used anaesthetised, saline hydrated dogs and urine flow was monitored following cannulation of the ureters. A powdered extract Allium sativum was administered intra-gastrically and increased UV and UNa, with between 30 and 40 min. Blood pressure was also decreased by this extract. Unfortunately, however, no statistical comparisons were performed and responses were deemed indifferent.[5]

Aerva lanata: Amaranthaceae

It is an erect herbaceous weed with many branches with spikes (shades ranging from white to pink) that are clustered and range between 1 and 1.5 in. in length.[8, 9] It is common in India, Sri Lanka, Arabia, Egypt, Ceylon, tropical Africa, Java and the Philippines.[9]

Ethnobotany-

It is usually prepared as an herbal drink.[10] It has traditional uses in Sri Lanka, being commonly prescribed by Ayurvedic doctors, alone or in combination, as a treatment for urinary infections.[11] This is not its only use, however, as it is suggested to possess analgesic, anthelmintic, anti-inflammatory, anti-malarial, anti-venin, diuretic and sedative properties. It is also suggested to be of use in the treatment of bronchitis, coughs, fractures, hematemesis, nasal bleeding, scorpion stings, spermatorrhoea, to clear the uterus after delivery, to prevent lactation and urinary calculi.[9, 10]

Diuretic activity-

Three studies, of which two were carried out in humans and one in conscious rats. Udupihille and Jiffry concluded that its leaves and flowers evoked a higher increase in UV than the whole herb itself. Unfortunately, however, this study did not include a placebo group for comparison and no numbers or statistics were reported in the text. [10, 12, 13]

Foeniculum vulgare: Apiaceae

Foeniculum vulgare is a glabrous, glaucous perennial or biennial plant growing up to 2.5 cm high. It has 3–4 pinnate leaves that are triangular in shape, long (5–50 mm) and filiform, with acuminate lobes which are cartilaginous at their apex. Its petals are yellow and oblong in shape. The fruit are also oblong, 4–10.5mmlong.[14] It is found across Europe (except the north), India, Java, Japan, Egypt, Guatemala and Morocco.[14, 15]

Ethnobotany-

Foeniculum vulgare is believed to exert natural analgesic, anti-inflammatory, anti-spasmodic, antidiabetic and antihypertensive.[14-16]

Diuretic activity-

Three studies have investigated the diuretic properties of Foeniculum vulgare used administered a hydroalcohol root extract to saline loaded rats.[14-17]

Taraxacum officinale: Asteraceae

It is a perennial weed roughly 15–30 cm in length with large, serrated leaves (5–40 cm in length) clustered in a rosette around the base of the plant. Its flowering stalks stand upright, are 5–40 cm long and carry a solitary terminal inflorescence. It is widely distributed inwarm temperate areas of the Northern Hemisphere, inhabiting fields and road and railway sides.[18]

Ethnobotany-

Taraxacum officinale has traditional uses in Germany, North America, Turkey and China.[18] Briefly, in Germany it has been used in the treatment of gout, diarrhoea, blisters, and spleen and liver complaints. In North America, it has been used in kidney disease, dyspepsia and heartburn. In Mexico is suggested to aid the control of Diabetes. In Turkey the herb is applied as a laxative, diuretic and used as an anti-diabetic medicine. In Traditional Chinese Medicine, Taraxacum folium is used to treat hepatitis and upper respiratory tract infections (i.e.,

bronchitis and pneumonia). Other uses include the treatment of arthritis and rheumatoid arthritis, certain skin conditions (e.g., eczema), weight control .[18, 19]

Diuretic activity-

The effect of Taraxacum folium (herb) and Taraxacum radix (root) on diuresis and weight loss, in conscious rats, have been compared and investigated previously. The concentration of the extracts ranged between 0.5 and 6% and effects were assessed on 2 days—days 1 and 30. UV and UNa were assessed using indices of diuretic and sodium excretion (i.e., the ratio of responses to placebo). This comparison showed that the herb had more marked effects that the root both acutely (diuretic index, 1.9 versus 1.4; and, sodium saliuretic index, 6.3 versus 2.6) and chronically (diuretic index, 2.1 versus 1.7; and, sodium saliuretic index, 4.0 versus 1.3). Numbers on days 1 and 30 seem to be similar, although this was not equivocal as no statistics were provided.[18, 20]

Lepidium latifolium and Lepidium sativum: Brassicaceae

Lepidium latifolium is a perennial plant growing to between 30 cm and even as tall as 2m. This plant has woody stems, waxy leaves and small white flowers arranged in clusters. The plant produces fruits in the form of two reddish seeds and roughly measures 1.6mm in diameter. Lepidium sativum is a perennial plant and eaten as a garnish. Lepidium is native to southern Europe.[21-23] Lepidium latifolium, but not Lepidium sativum, is also native to Asia and nowadays can be found growing in the wild across North America.

Ethnobotany-

The Lepidium latifolium has traditional uses as anti-escrobte, stomach tonic, aperitif and diuretic. In Morocco, Lepidium sativum is considered a herbal medicine and recommended in the treatment of hypertension, diabetes and renal disease.[21-23]

Diuretic activity-

Navarro et al. determined the urinary effects of an aqueous leaf extract (from Lepidium latifolium) over a 6 h period. When given intra-gastrically, UV increased (~60 ml kg−1 versus ~40 ml kg−1 [versus placebo]) but UNa and potassium were unchanged. These effects were seen at two doses (50 mg kg−1 and 100 mg kg−1). The authors also tested the responses following the intra-peritoneal injection of Lepidium. This time,

only the highest dose increased UV (~50 ml kg−1 versus ~40 ml kg−1).[21]

Sambucus mexicana and Sambucus nigra: Caprifoliaceae

The genus Sambucus contains between 5 and 30 species of fast-growing shrubs and small trees growing that grow to less than 10m high. Its leaves are serrated and arranged in opposition to one another in a pinnate with 5–9 leaflets that are 5–30 cm in length and around 3–5 cm in width. In late Spring Sambucus flowers and this is followed the production of bunches of small red, bluish or black berries that are 3–5mm in diameter. The genus Sambucus is found in temperate to subtropical regions of the Northern and Southern Hemispheres, with its distribution being more widespread in the Northern than Southern Hemisphere.[24]

Ethnobotany-

Sambucus nigra is consumed in preserves, wine and juice, and is recognised as potentially having health benefits owing to its antioxidant and antiviral properties, and immune system modulation via cytokines.[24] Thus, areas in which Sambucus nigra has been postulated as beneficial include diabetes, lipid lowering and protection against vital infections such as HIV, influenza and herpes simplex. In complete contrast, Sambucus Mexicana is not as commercialised and not considered for its medicinal properties.[25]

Diuretic activity-

Beaux et al. tested the leaves from Sambucus nigra and Caceres et al. used an ethanol extract of Sambucus Mexicana.[17, 26] Both species are used in traditional medicines although the actives are unclear and could involve di- and tri-terpene, glycosides and phenols (e.g., flavanoids, tannins and coumarins).[17]

Cecropia leucocoma and Cecropia pachystachya: Cecropiaceae

Cecropia is a genus with roughly 25 species of trees. Cecropia is identified by its large, circular palmate lobed leaves that are between 30 and 40 cm in width and deeply divided into 7–11 lobes. In northeast Argentina, Paraguay and southern Brazil, Cecropia pachystachya can reach heights of around 10m with large, dual coloured leaves that are dark-green on their upper-side and silver-grey on their underside. In central Argentina, Cecropia pachystachya is not as tall and reaches heights of less than 1m.[27]

This tree can is found in the forests of neotropical regions in paranaense phytogeographical province in Northeast Argentina, Paraguay and southern Brazil, and the temperate hilly grasslands of central Argentina.[27, 28]

Ethnobotany-

Cecropia pachystachya is a traditional medicine and used as a dietary supplement, a treatment for coughs and asthma, a cardiotonic and as a diuretic.[28] Indeed, studies in rats show it may lower blood pressure and this could be explained by diuresis. The traditional use of Cecropia leucocoma is not so well described. Although, we are led to believe that in the state of S¨ao Paulo in Brazil it is a medicinal plant popularly used for its diuretic and hypertensive properties.[29]

Diuretic activity-

Cecropia leucocoma was administered to rats implanted with a urinary catheter. UV was collected for 4 h after its administration and shown to increase, compared with a placebo control, after 30, 120 and 240 min. Indeed, at the end of the recording phase UV was 5.5 ml in the treatment group and 1.6 ml in the placebo group.[28] The second trial explored the cardiovascular effects of Cecropia pachystachya and showed a lowering of steady state blood pressure with extracts obtained from neotropical and temperate regions.[27]

Spergularia purpurea: Caryophyllaceae

This is a glabrous or pubescent plant that inhabits sandy soil with a stem that is around 2–2.5 cm in width and about 5–15 cm in height. Its leaves are arranged in a rosette and between 8 and 40mm in length. Its flowers are a rose-purple colour and 3–4.5mmin length. This plant originates from Asia and Europe.[30]

Ethnobotany-

Spergularia purpurea is documented as being used in traditional Moroccan medicine and a water extract is prepared from the whole plant and used in the treatment of renal disease, hypotension and diabetes.[31]

Diuretic activity-

Jouad et al. administered Spergularia purpurea, furosemide (10 mg kg−1) and a placebo to normal rats and measured UV and urinary electrolytes every week for 4 weeks. Data showed significant increases in UV with Spergularia purpurea and were

seen after 1 week of intervention and sustained till week 4 (~23 ml 24 h−1 with 400 mg kg−1 of Spergularia purpurea).[30]

Cucumis melo and Cucumis trigonus: Cucurbitaceae

Cucumis melo is oval in shape, measures up to around one foot in length, has smooth skin interspaced by length-wise grooves. Cucumis trigonus, like Cucumis melo, is a fruit and resembles a small egg streaked with yellow and green, and is extremely bitter. Cucumis melo is found Worldwide and Cucumis trigonus can be located in North India.[32, 33]

Ethnobotany-

Cucumis trigonus and Cucumis melo are from the Cucurbitaceae family.[32, 33] In India the seeds from Cucumis melo are produced to provide a sweet edible oil that has nutritional value and analgesic, anti-inflammatory and diuretic properties. In contrast, Cucumis trigonus has no traditional usage, but the alcohol extract contains a glycoside fraction which, via its anti-inflammatory properties, may promote diuresis.[32-34]

Diuretic activity-

The diuretic effect of Cucumis trigonus was tested in conscious albino rats and the study included a placebo group and a positive test group (i.e., hydrochlorothiazide). After oral administration, UV was measured for 6 h.[32]

Elephantopus scaber: Equisetaceae

Elephantopus scaber is a shrub that grows in the wild. It grows to a height of between 20 and 40 cm, has a high rosette of leaves. Its leaf stems are very short, white, and hairy and can be found close to the ground. Elephantopus scaber is a small herb that grows in hotter regions of India and throughout America.[35]

Ethnobotany-

Elephantopus scaber has a wide range of reported uses in traditional medicine. Indeed, it has been used as an analgesic, anti-emetic, anti-inflammatory, anti-microbial. It has been used in conditions such as bronchitis, smallpox, diarrhoea and suggested to have cytotoxic and anti-tumoral properties.[35-38]

Diuretic activity-

Two studies have tested its diuretic properties; ine in conscious rats and the other in a human trial gave Elephantopus

scaber to conscious rats and showed no effect on UV after 3 h. Its effect on UNa not tested.[39,]

Orthosiphon stamineus: Lamiaceae

Orthosiphon stamineus comes from little oval, green leaves that are finely toothed and rolled like ordinary tea. Orthosiphon stamineus is an herb that is found growing in tropical areas and is popular medicinal plant in Southeast Asia where it is consumed as an herbal tea.[26, 40, 41]

Ethnobotany-

Orthosiphon stamineus is traditionally used to treat hypertension, diabetes, urinary disorders, rheumatism, tonsillitis and menstrual disorders.[26, 42-44] It is also documented in the German Pharmacopoeia DAB 9 and considered effective in humans by the Commission E of the Federal Health Authority (BGA).[42, 43]

Diuretic activity-

Three trials have been conducted in rats. Englert and Harnischfeger tested the diuretic effect of a mixture of leaves and stems from Orthosiphon in conscious, volume loaded rats. UV was unchanged by this intervention, but UNa increased (~2-fold, compared with placebo, at a dose of 750 mg kg−1), as did urinary potassium (~2-fold) and chloride (~3-fold). However, no statistics were reported and for this reason we scored these effects as not being significantly different and conclude Orthosiphon stamineus had no effect.[42]

Conclusion:

The current review is intended to provide an overview of the current knowledge surrounding the use of herbal medicines as diuretics. We think the present findings are of interest where herbal medicines are used according to folklore. This is extremely important and potentially very useful in countries that have limited resources for the production and importation of modern medicines as they are accessible, cheap and applicable to the local population.

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