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REVIEW ON UVA-URSI- A MIRACLE HERB FOR URINARY TRACT DISORDERS

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ABSTRACT

The traditional Indian system of medicines like Ayurveda mainly uses medicinal plants for the management of diseases. Ayurveda provides holistic treatment combating physical as well as mental illnesses. As herbal products are natural and safe, recognition of herbal medicines is gradually increasing throughout the world. Urinary tract infection is one of the most common types of infection affecting the general population. Uva Ursi (Arctostaphylos uva-Ursi) is traditionally used as a tonic herb for urinary health. It is a less known herb but has well-known role in folk medicine and innumerous researches which have proved its potency in Urinary tract infections. Thus in this review paper we have described the role, chemical composition, pharmacology, side effects and dosage of Uva Ursi in combating the above mentioned infections.

KEYWORDS: Urinary tract infections, Uva Ursi, chemical constituents, Arbutin.

INTRODUCTION

The world today is plagued by numerous diseases. Advancements in medical science have led to the discovery of many therapies and treatment which to a large extent has alleviated human problems. Ayurveda which has been widely recognized as a system of natural health care describes a wide ranging system of natural medicine that put forth a range of approval for different aspects of life which taken together have the ability to generate perfect health and long life. Ayurveda provides holistic treatment combating physical as well as mental illnesses. Our modern age proudly displays a lifestyle where work, communication business and travel has been made extremely easy for man, with various gadgets and machines equipped with previously unheard of electronic technology. Still, in spite of these comforts life has become more complex and competitive. Man finds himself more under stress than ever before because with the modern technology and lifestyle, more is demanded of him. Several diseases have sprung up and are increasing due to the basic factor of disturbed life style. Urinary tract disorders are one of them.

MATERIALS AND METHODS

Uva Ursi

Botanical Name- Arctostaphylos Uva-Ursi.
Family- Ericaceae.
Common Name- Bearberry.

Botanical Description

Uva-Ursi is a low growing evergreen shrub with creeping stem that forms a dark green carpet of leaves. It can grow to 20 inches in height. The plant has small dark, fleshy, leathery leaves and cluster of small white or pink bell shaped flowers. It blooms from April to May and produces a dull orange berry. The plant grows abundantly through the northern hemisphere from Asia to United States.

History

Like many other herbs, Uva Ursi has a long history of effective use. From the middle ages, the herbalists indicate that Uva Ursi was a reliable diuretic effectively used in urinary infection. By the end of 1700's it had become official in the London pharmacopoeia. It has a history of medicinal use dating back to 2nd century. It has been widely used as diuretic, astringent and antiseptic. Folk medicine around the world has recommended Uva Ursi for nephritis, kidney stones and chronic cystitis. The herb has also been used as a general tonic for weakened kidneys, liver or pancreas. Native Americans used it as a remedy for headaches to prevent and cure scurvy and to treat urinary tract infections. In fact, until the discovery of sulpha drugs and antibiotics, Uva Ursi was the drug of choice for such bladder and related infections. As officially described, Uva Ursi leaves are very short stalked, obovate or oblong spatulate coriaceous, from 15 to 20mm. long and 5 to 8mm. broad, obtuse slightly revolute on the margin, upper surface with depressed

veins; lower surface distinctly reticulate, odor faint, hay like; taste strongly astringent and somewhat bitter-(U.S.P).

Chemical composition

The leaves of Uva-Ursi contain large quantities of Gallic acid. The active principle is the crystallisable glycoside, arbutin, announced by Kawalier in 1852. Previously, J.C.C Hughes (Amer. Jour. Pharm. 1847, p.88) attributed the diuretic power of leaves to a crystallizable substance which he called Ursin. This substance was subsequently shown by Jungmann (ibid, 1871, p.205) to have been arbutin mixed with some Gallic acid. Diluted acids as well as the ferment emulsin, decompose arbutin into sugar, hydroquinone ($C_6H_6O_2$) (arctuvin of kawalier) and methyl hydroquinone ($C_6H_5[CH_3]o_2$) which substances may occur in the herb together with arbutin.Upon destructive distillation of an extract of Uva-Ursi, hydroquinone can be isolated from the distillate (Uloth, 1859). Other constituents of leaves are bitter glycoside ericolin, and its decomposition product ericinol (Rochleder and Schwarz, 1852 and R. Thal, pharm. Zeitschr.fur Russland, 1883, p.209) the crystallizable substance urson, insoluble in water (H.Tronmsd orff, 1854); tannic and malic acids, a small quantity of volatile oil, fatty mater, wax, gum, sugar, coloring matter, a yellow coloring matter, allied to quercetin, of the formula $C_{15}H_{10}O_7$ was isolated by A.G. Perkin (see Amer. Jour Pharm, 1898 p. 584). It forms phloroglucin and protocatechuic acid upon fusin with alkali. The ash of the leaves of Uva Ursi amounts to about 3 percent. The leaves are free from the poisonous andromedotoxin, which occurs in certain other Ericaceae.

Arbutin ($C_{25}H_{34}O_{14}$, Hlasiwetz and Habermann, 1883) also occurs in other Ericacere (see Pyrola, Kalmia, Gaultheria, etc) from the leaves of Uva Ursi it is obtained by adding solution of subacetate of lead to a decoction of the leaves removing the lead from the filtrate by sulphide of hydrogen, and evaporating to crystallization. The crystals are purified by treatment with a mixture of ether (8parts) and alcohol (1part) are subsequently crystallized from water. It forms colorless, long, silky needles of bitter taste, natural reaction, very hydroscopic easily soluble is hot water and alcohol, hardly soluble in ether. In aqueous solution rendered alkaline by ammonia or caustic potash, arbutin acquires a deep azure blue color with phosphomolybidic acid (Jungmann, loc, cit).

Pharmacology

(i) Absorption

Arbutin is stated to not be hydrolyzed into hydroquinine and glucose in the stomach.In the small intestine, both the rat and the human appear capable of absorbing arbutin via sodium dependent glucose transporters like most phenylglucosides (small phenolics like hydroquinone bound to glucose).Tablets of Uva Ursi (472.5mg dry leaf extract containing 105mg arbutin) and loose leaves (945mg containing 210mg arbutin) both appear to be absorbed after oral ingestion as assessed by urinary elimination (which requires absorption from the gastrointestinal tract at some point) with an approximate bioavailability of between 67.3-70.3% for the main bioactive arbutin.

(ii) Cellular Kinetics

At a concentration of 5mg/mL (dry leaf equivalents), Uva Ursi appeared to inhibit the P-glycoprotein (P-gp) transporter, a protein that imports and exports xenobiotics from cells, after 15-60 minutes of measurement in monocytes (with little effect being seen in colorectal Caco-2 cells) while increasing its activity in both monocytes and Caco-2 cells following 18 continuous hours of incubation; potency of tested extracts varied, and due to relatively rapid absorption and elimination of Uva Ursi in humans it could be speculated that the acute measurement is more relevant rather than the latter.

(iii)Metabolism

Arbutin, following absorption, seems to be deglycosylated rapidly and then acted upon by phase II enzymes to either sulfonate the free hydroquinone into hydroquinone sulfate (via SULT enzymes) or glucuronidate them into hydroquinone glucuronide (via glucuronidase enzymes); there seems to be twice as much glucuronidation as there is sulfation, as assessed by urinary metabolites of arbutin.

(iv)Phase I Enzyme Interactions

When Uva Ursi extract has been tested in vitro for P450 enzyme inhibition, the water extract showed inhibitory activity against CYP19-aromatase, CYP2C19, CYP3A7, CYP3A5, CYP3A4 (upwards of 70% inhibition at 1.25mg/mL dry mass equivalents). The methanolic extract also had inhibitory properties to a more variable degree with exception of CYP19 where it was inactive.

(v) Elimination

Arbutin from Uva Ursi appears to be eliminated in the urine, where it is thought to act locally via its hydroquinone metabolites. Hydroquinone glucuronide can be detected in the urine following oral ingestion of Uva Ursi within three to four hours (when about half the oral dose can be detected), reaching peak concentrations of 0.7-1.14µM/mL (700-1,140µM) or 199-327µg/mL (from 105-210mg arbutin orally) with no detectable metabolites after 24 hours. Hydroquinone sulfate can also be detected (at about a third the concentration of the glucuronide) while free hydroquinone was only found in trace levels in this study (0.1% total hydroquinones), although it has shown variability between undetectable and 5.6% in another study. Arbutin itself is not eliminated in the urine. Bacteria in the urinary tract may bioactive hydroquinone (from hydroquinone glucuronide) by metabolizing the bond between the two molecules, leading to a high bacterial intracellular concentration of hydroquinone *in vitro*.

(vi) The Benefits of Uva Ursi herb-

- ✓ Uva Ursi herb is used as a tonic for strengthening body parts like kidneys, pancreas as well as liver.
- ✓ This herb has been used to make the urinary passage more strong and tone it as well.
- ✓ Uva Ursi is helpful in preventing any postpartum infection from happening as well as spreading.
- ✓ The astringent properties found in Uva-Ursi herb are useful in curing problem of bedwetting.
- ✓ Uva Ursi is extremely helpful is treating chronic diarrhea. The astringent property found in Uva Ursi is helpful in binding of the stool which can cure help diarrhea.
- ✓ Uva Ursi is popularly used in many nutritional supplements as it acts as a muscle relaxant it helps in soothing the irritated or inflamed tissues and making them strong and tight.
- ✓ The leaves of Uva Ursi herb have astringent, antiseptic as well as diuretic properties. These properties are helpful in curing chronic ailments like kidney stones, chronic cystitis and nephritis.
- ✓ Uva Ursi is helpful in neutralizing urine acidity. It improves the flow of urine and helps in reducing water retention as well as bloating; this helps in reducing weight and maintaining it as well.
- ✓ Uva Ursi is helpful in treating inflammatory problems of the urinary tract such as cystitis or urethritis.
- ✓ The Uva Ursi is rich in an element known as allantion which aids soothing of the tissues as well as repairing them. Thus, it is used externally to wash and clear cuts and scrapes just like an astringent. Allantoin in helpful in curing cold sores, vaginal infections and herpes.
- ✓ Uva Ursi is a very strong diuretic and it helps in lowering high blood pressure.
- ✓ Uva Ursi tea is helpful in treating ailments that are caused by bacterium like E-coli, mycoplasma hominis, candida albicans. Proteus vulgaris and staphylococcus strains.

Worldwide acceptance

Uva Ursi has been approved for treating inflammation of the lower urinary tract by commission E of the German Federal Institute for drugs and medical devices, which is a German governmental agency that evaluates the safety and effectiveness of herbal products.

Side effects

Uva Ursi is possible safe for most adults when taken by mouth short term (for upto one month). It can cause nausea, vomiting, stomach discomfort and a greenish brown discolouration of the urine. However, Uva Ursi is possible unsafe when taken by mouth in high doses or long term. It can cause liver damage, eye problems, breathing problems convulsions and death.

Special precautions and warnings

1. Pregnancy and breast feeding: Using Uva Ursi during pregnancy is likely unsafe because it might start labor. Not enough is known about the safety of using Uva Ursi during breast feeding. Avoid use if you are pregnant or n Ursing.
2. Children: Uva Ursi is possibly unsafe in children when taken orally.
3. Retinal thinning: Uva Ursi contains a chemical that can thin the retina in the eye. This could worsen the condition of the people whose retinas are already too thin. Avoid use if you have this problem.

Dosage

The standard Uva Ursi dose for the treatment of urinary ailments is determined by the arbutin content of the supplement. The recommended dose is between 420-600 mg taken once a day in three doses. Uva Ursi tea and capsules are both effective for delivering arbutin to the urinary tract.

CONCLUSION

The results of research articles are encouraging and indicate that this herb should be studied more extensively to confirm these results and reveal other potential therapeutic effects. The key to health can be found not in drugs or in special machines but in the prime factors on which our life and vitality is based. Without changing the body and mind inputs there is no root treatment for the diseases. Diet and lifestyle changes are an essential part of the management and treatment procedure for urinary tract infections. Still role of drugs can't be neglected. A number of recent research projects have clearly demonstrated that when the phenolic glycosides, in Uva Ursi especially arbutin, are converted to hydroquinone inside the body, they act as a powerful antibiotic. Uva Ursi has been shown to be effective for treating urinary tract infections, such as cystitis and urethritis, boils and abscesses infected with the staphylococcus aureus bacterium and also food poisoning and diarrheas. In addition to its antiseptic and astringent actions, Uva Ursi may help to flush out bacteria by promoting urination. It has been used to reduce the accumulation of uric acid and relieve pain of bladder stones. An important active principle of Uva Ursi is Arbutin which has been shown to possess a remarkable range of therapeutic properties i.e. antiseptic, antibiotic, astringent, and diuretic. Clinical trial using Uva-Ursi, for a variety of conditions should also be conducted.

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