

Onion in Dentistry: An Update

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Abstract

The onion is round or oblong tunicated bulb. It is a biennial garden plant having a scape which is 2 to 4 feet high smooth, straight, stout and swollen at the base. The onion has many medicinal properties which are described in literature from time to time. This review describes the application and use of onion in dentistry and its other medicinal properties.

Keywords: Onion; Medicinal Plants; Allium.

Introduction

The onion is a tunicated bulb which is compressed, round or oblong in shape. It is invested with a thin, shiny dry membrane which is reddish or white in color. It is less pungent than garlic and sweet in taste and have a peculiar odor [1,2]. The common onion is a biennial garden plant having a scape which is 2 to 4 feet high smooth, straight, stout and swollen at the base. At the top of scape there is a round umbel of greenish-white flowers. The leaves are round and fistulous having shining green color and shorter than the stem [2].

Properties of Green Onion

The green onions contain essential oils which stimulate the sweat glands and promote sweating. It helps in normalizing blood pressure. It increases appetite and helps in preventing diarrhoea. The green onion is rich source of sulfur which kills or inhibits fungus infections. It inhibits cancer cell growth especially colon cancer. The green onion's anti-colon cancer properties are well known among traditional healers around the world. Green onion is rich source of vitamin A and C and calcium. Though the onion is

quite unusual some studies showed an inverse association between the frequency of use of allium vegetables and the risk of several common cancers [3].

Uses in Dentistry

Onion has different applications in dentistry. Though its medicinal properties yet to be established with help of research studies. However the several studies have been conducted in different oral diseases to establish its potential use in dentistry.

Periodontitis

Onion extracts has antibacterial effect on *P. Gingivalis* and *P. intermedia* and the effects were bactericidal against cultured and resting bacterial cells. The activity of the onion extracts was stable even after 48 hours in the culture medium⁴. Thus onion extract plays an important role in prevention and management of periodontal diseases.

Caries

The potential anticarcinogenic action of onions may also be related to their high content of organosulfur compounds or to their high antioxidant activity which is principally due to their wide content of flavonoids. However there are important varietal differences in the composition, concentration and beneficial activities of these bioactive compounds which also result by modalities of cooking [5]. The effect of onion extracts on *Streptococcus mutans* and *Streptococcus sobrinus*, the main causal bacteria for

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dental caries have been assessed by several research studies. The results showed that the onion extracts possess an effect on all test bacterial strains and the effects were bactericidal against cultured and resting bacterial cells [6].

Antioxidant Properties

The antioxidant capacity of onion was widely studied by both in vivo and in vitro methods. The common invitro methods for evaluation of antioxidant properties are as follows: DPPH (1,1-diphenyl-2-picrylhydrazyl) assay [7], ferric reducing antioxidant powder, oxygen radical absorbance capacity and ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonate) assay. The invivo methods are based on animal models (such as mice, rabbit) or cells models (Caco-2, Raw 264.7) to measure the antioxidant activity such as SOD (superoxide dismutase), LOX (lipoxygenase), and MDA (malondialdehyde). However in vitro methods are commonly used to evaluate the antioxidant activity of onion. The polyphenols, anthocyanins, flavonoids, quercetin and their glycosides have been reported in onions [8]. Polyphenols are natural substances in plants that are antioxidants with the potential to protect the body diseases. Previous studies showed that the main phenolics found in onion are quercetin, gallic acid, ferulic acid and their glycosides [9]. Flavonoids are a class of phenolic compounds which impart bitter and astringent flavours to fruits and vegetables. Proanthocyanidins are a class of flavonoids composed of flavan-3-ol monomeric units. These monomeric units can be constituted of two types of double linkage between the flavan monomeric units [10]. Onion has been characterised by its flavonol quercetin and quercetin derivatives [11]. Recently an increasing attention has been paid to the antioxidant content of onion because epidemiological studies have indicated that regular consumption of onions is associated with a reduced risk of neurodegenerative disorders, cancers and cataract formation [7]. The un-utilized outer layers of the red variety of *A. cepa* L. was found to be a rich source of quercetin (5110µg/g) with high antioxidant activity. Total phenolic compounds were estimated by HPLC and LC-MS/MS methods. The stem distillate from freeze dried *A. cepa* L. was found to exhibit moderate antioxidant activity in a malonaldehyde/gas chromatography assay and thiobarbituric acid assay [12].

Anti-Inflammatory Activity

The stem distillate from freeze dried *A. cepa* L. was reported to exhibit anti-inflammatory activity with a dose related response in lipoxygenase inhibitor

screening assay [12].

Wound Healing Activity

The alcoholic extract of tubers of *A. cepa* L. was found to have better wound healing activity in excision, incision and dead space wound models in albino rats. It was due to free radical scavenging action and the antibacterial property of the phytoconstituents (Tannins and Flavonoids) that fastens the process of wound healing [13]. Externally fresh onion juice is used to prevent bacterial and fungal infections. It can be applied to wounds and stings on the skin, used to remove warts, used to stimulate hair growth and even used to reduce unwanted skin blemishes. Warm onion juice dropped in the ear is said to help relieve earache. Baked onion is used to draw pus from abscesses. Modern scientific research supports many of the traditional uses for onion. Onion contains thiosulphinate, a compound that is effective in killing many common bacteria including *Salmonella typhi*, *Pseudomonas aeruginosa* and *Escherichia coli*. This finding supports the folk use of onion to treat wounds and skin infections and possibly its use for an upset stomach. Even more supportive are small clinical studies on humans that show that both fresh onions and commercial onion extracts actually lower blood cholesterol levels, lower blood pressure and help prevent the formation of blood clots [13]. A roasted onion employed as a cataplasm to suppurating tumours or to the ear in otitis, has proved beneficial. A saturated tincture of onions made with good Holland gin has been found serviceable in gravel and dropsical affections. A cataplasm of onions pounded with vinegar applied for a number of days and changed 3 times a day has been found to cure corns and bunions. In homeopathy, *Allium cepa* is used for rhinorrhoea and hay fever [13].

Bone Health

Onions may be especially beneficial for women who are at increased risk of osteoporosis during the menopause. Onion's gamma-L-glutamyl-trans-S-1-propenyl-L-cysteine sulfoxide (GPCS) inhibits the osteoclastic activity and fights osteoporosis. Onion syrup is useful in extracting renal stones. Onions are also a recommended treatment for edema due to their diuretic effect. They also promote the menstrual periods. Onions inhibit bone resorption by 20% when consumed at a rate of 1g per day per kg of body weight. This was slightly higher than the rate of bone resorption obtained from the calcitonin that is typically used to treat postmenopausal osteoporosis. These findings suggest that onion intake may be an useful dietary approach to improve bone health [14,15].

Medical Application of Onion

Diabetes

Onions are believed to be effective in diabetes. The Allyl propyl disulfide and chromium found in onion can decrease fasting blood glucose levels, improve glucose tolerance and lower the insulin levels. Use of S-methylcysteine sulfoxide and S-allylcysteine sulfoxide (200mg/kg/day) gave results comparable to treatment with insulin or glibenclamide but without the negative side effect of cholesterol synthesis stimulation. It was found that a 3% onion powder diet reduces hyperglycemia, circulating lipid peroxides and blood cholesterol (LDL-VLDL exclusively) [16,17]. In vivo analysis of the effects of quercetin on human diabetic lymphocytes showed a significant increase in the protection against DNA damage from hydrogen peroxide at the tissue level [18].

HIV

It was also shown that quercetin may diminish virus replication by inhibiting vpr function. At 10 μ M dosage, quercetin provided 92% inhibition of vpr-induced cell cycle abnormality [14,19].

Immunosuppression

Quercetin was shown to suppress both immune and nonimmune injury responses the key risk factors in chronic graft loss. It has also shown to prevent immunosuppression induced by UV exposure to mice. The researchers noted the conflict in findings with other studies and offered an explanation that the immune response was reduced by anti-inflammatory activity via the arachidonic acid pathway [14,20].

Hepato Protective Activity

The hepatoprotective activity of aquatic and alcoholic extract of *A. cepa* L. was evaluated in CCl₄ and paracetamol induced hepatic injury in rats. It was studied by estimating the serum levels of serum glutamic oxalo acetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), alkaline phosphatase (ALP), direct and total bilirubin. It showed significant reduction of CCl₄ and paracetamol induced elevated serum enzyme and pigment level [21].

Morphine Withdrawal

Onion capsaenes and thiosulfates have been

shown to inhibit cyclooxygenase and 5-lipoxygenase activity suggesting one mechanism for benefit. The anticholinergic effects of quercetin also were hypothesized to attenuate morphine withdrawal normally thought to be exacerbated by acetylcholine stimulation [22,23].

Anthelmintic Activity

The crude extract of *A. cepa* L. bulb showed strong anthelmintic activity on *Pheretima posthuma* (earthworm) [24].

Anemia

Onions are noted for their easily assimilate iron content. They are, therefore, beneficial in the treatment of anemia.

Heart Diseases

Onion is believed to have a positive effect on the circulatory system. It has been used as a diuretic to reduce swelling. It is also thought to help reduce arteriosclerosis by lowering blood cholesterol levels and preventing the formation of blood clots. Onion has been used to treat diabetes and is reputed to lower blood sugar levels. Recent researches in the west have established onion as an effective preventive food item against heart attack. In 1966 Dr. N.N. Gupta of the K.G. Medical College, Lucknow and a panel of doctors in England in 1968 have stated that onion has been found helpful and beneficial in diseases of the heart. According to them these benefits are due to the presence of essential oil, allylpropyl disulphide, catechol, protocatechic acid, thiopropion aldehyde, thiocyanate, calcium, iron, phosphorus and vitamins in onion. Dr. N. Radhakrishnan Principal of the Trivandrum Medical College and Dr. K. Madhavan Kutty have established after seven years of research that to get rid of coronary heart or blood pressure disorders and one should take 100 gms of onion per day. The onion are very valuable in heart diseases as they correct thrombosis and also reduce blood cholesterol [1,2].

Conclusion

The onion has great therapeutic potential in treatment of various oral diseases. However more research studies are needed to explore its therapeutic potential. It holds a great herbal therapeutic modality for oral diseases.

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