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3. Onion (*Allium cepa*) – Ethnomedicinal and therapeutic properties

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Abstract. Onion is one of the civilization's oldest medicines and is described as the dynamite of natural foods. In the current day scenario, herbal medicines have gained global significance with both medicinal and cost-effective implications. Thus, scientific appraisal has turned out to be a prerequisite for recognition of physical fitness in nature. An exceptionally strong antioxidant, onion is the richest source of numerous compounds occupying the second position as an imperative vegetable grown and consumed all over the world. A unique combination of three families of compounds-fructans, flavonoids and organosulfur compounds that have salutary effects on human health probably attribute to the therapeutic properties of onion. Compounds from onions have a range of health benefits such as anti-carcinogenic, anti-platelet, anti-thrombotic, anti-asthmatic, anti-diabetic, fibrinolytic, anti-helminthic, anti-inflammatory, antiseptic, antispasmodic, carminative, diuretic, expectorant, febrifuge, hypoglycemic, hypotensive, lithontripic and hypo-cholesterolemic properties and other various biological actions including antibiotic effects. The bulb though used in food and culinary preparations since time

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immemorial, acts as a home remedy for many infections, inflammations, respiratory and digestion problems. The wide-ranging gamut of biological activities in onion lay concrete on research to attest and discover an assortment of other novel therapeutic properties.

Introduction

Nature has a hand down on mankind with numerous herbs and herbal resurgence is budding from all corners of the globe. Certain substances present in medicinal herbs are recognized by the current and primeval civilizations for their remedial properties. Herbal medicines have turned out to be the most universal in recent past due to their less adverse and non-toxic effects on mankind [1]. Naturally occurring plant metabolites are the key resource for most modern medicines where the products obtained will be tailored using the vital element as escort compound [2].

Onion is the one of the most important commercial condiment vegetable grown and consumed not only in India but also all over the world. It is the oldest cultivated crop and the pungent edible bulb of the lily family considered as a food of exceptional value for flavoring and seasoning. Onions are perennials, where the fleshy bulb that grows below the ground is used medicinally as well as for food. The green stems and leaves are hollow and can reach 3 ft (1m) in height. The plants bear small flowers that are usually white or purple. The onion is a hardy, bulbous, biennial plant, usually grown as an annual. It has superficial root system, a very short flattened stem at the base of the plant, which increases in diameter as growth continues. The leaves of the plant are long, linear, hollow, and cylindrical. Thickening of the leaf bases forms a bulb, when the plant reaches a certain stage of growth [2].

The most important properties of onion embraces on antioxidant, anticancer, antimicrobial, asthma, cardiovascular Compounds like sulfur, organo-sulfur, calcium and riboflavin from onions have a range of health benefits such as anti-carcinogenic, anti-platelet, anti-thrombotic, anti-asthmatic, anti-diabetic, fibrinolytic and hypo-cholesterolemic properties and other various biological actions including antibiotic effects. Though copious literature is available on onion and its curative effects on diabetes, thrombosis, cardiovascular and respiratory problems, it seems insufficient. Thus more research has to be delved in, to comprehend the therapeutic and salutary effects of onion bulbs.

Origin and distribution

Onion is believed to have originated in Central Asia, perhaps in the Iran-Pakistan region. It has been cultivated since ancient times in the Middle East

and India. It was a popular food in ancient Egypt, where it is depicted on tombs as early as 3200 BC and has been found in mummies. The Sanskrit equivalent for onion is "palandu", which has been mentioned in the Garuda Purana. The great Indian sages, Maharishi Atreya and Lord Dhanwantri have described the use of onions in details (http://www.best-home-remedies.com/herbal_medicine/vegetables/onion.htm). It is referred to in the Bible and the Koran and also mentioned in the literature from Hippocrates, 430 B.C. down to present time. It derived its name from the Latin *Onio* and French *Oignon*.

Onion was introduced into the new world shortly after its discovery, and was cultivated there as early as 1629. It is now distributed throughout temperate regions of the world including Europe, Asia, North America and Africa [3]. It has several vernacular names such as onion in English, Cyvannulli in Malayalam, Erragadda or Ulligadda in Telugu, Vengayam in Tamil, Niruli in Kannada, and Pyaj in Hindi.

Nutritive value and composition

Onion has been described as the dynamite of natural foods. The outstanding characteristic of onion is its pungency, which is due to a volatile oil known as allyl-propyl disulfide. It contains vitamin B and a trace of vitamin C and also traces of iron and calcium. Onions when compared with other fresh vegetable are relatively high in food energy, intermediate in protein content and rich in calcium and riboflavin. There is substantial disparity in composition between different varieties and it also varies with phase of mellowness and the length of storage. Onion has been accepted as an important source of valuable phytonutrients as flavonoids, (FOS) fructo-oligosaccharides and thio-sulphinates and other sulfur compounds [4]. An investigation of a mature onion shows 86.6% moisture content, 1.2% protein, 0.1% fat, 0.6% fiber, 0.4% minerals, 11.1% carbohydrate principally in the form of sugars per 100gms of edible portion. Apart from calcium and riboflavin as mineral and vitamin, it also has phosphorus, iron, carotene, thiamine, and niacin in pocket-sized quantities. Its calorific value is 51.

Medicinal virtues

Onion is one of civilizations oldest medicines. It was apparent in early Mesopotamia to heal virtually every ailment. The physicians of primordial Egypt prescribed onions in various diseases. Dioscorides in the first century A.D. attributed many herbal remedies to them like stimulant, diuretic,

expectorant and rubefacient. Onions should be taken with meals, preferably raw, as fried or cooked onions are comparatively difficult to digest. For therapeutic purposes, it is advisable to use onion juice instead of the whole onion, as it is an all-round medicine [5].The Allyl propyl disulfide and chromium present in it decrease fasting blood glucose levels; perk up glucose tolerance and lower insulin levels. Onions may be principally beneficial for women, who are at augmented risk of osteoporosis during the menopause as the compound gamma-L-glutamyl-trans-S-1-propenyl-L-cysteinesulfoxide (GPCS) inhibits the osteoclasts (the cells which break down bone) activity and fights osteoporosis [6]. Onions are also optional treatment for edema owing to their diuretic effect and its syrup is useful in extracting renal stones.

Table 1. Compounds from Onion and Disease Prevention.

Compounds	Disease Prevention	References
Allyl Propyl Disulfide	Diabetes	[6]
3-mercapto-2-methyl pentan-1-ol	Peroxynitrite induced Diseases	[24]; [25]
Gamma-L-glutamyl-trans-S-1-propenyl-L- cysteine sulfoxide	Osteoporosis	[15]
Allypropyl disulfide, Catechol, Protocatechnic acid, Thiopropiono aldehyde, Thiocyanate, Minerals and Vitamins.	Cancer	[12]; [13]
Flavonoids	Anti- inflammatory, Anti-microbial, Atherosclerosis, Blood coagulation	[1]
Vitamins and minerals	Haemostatic effects, platelet aggregation, decreased hematocrit, and increased fibrinolytic activity	[17]; [18]
Organosulfur compounds	Cardio vascular problems	[19]
Chromium, B_6, selenium, Phosphorus, calcium, magnesium, Sodium, potassium	Tooth disorders, Piles, Urinary infections, Sexual Debility, Cholera, Ear and Skin disorders, Cough, Anemia etc.	[6]

Interest in the potential health benefits of *Allium* includes antibiotic effects [7,8,9]. *Allium* plants, which include onion, exhibit antibiotic activity against both Gram-positive and Gram-negative bacteria [10]. Numerous *in vitro*, animal, and epidemiological studies indicate that onion or onion extract prevents cancer including gastrointestinal cancer, ovarian cancer, and skin cancer [11,12,13]. Onion has been experimentally documented to possess anti-diabetic potential. In a clinical study of alimentary hyperlipidemia, onion and onion essential oil prevented fat-induced increases in serum cholesterol and plasma fibrinogen and decreases in coagulation time and fibrinolytic activity. In animal studies, ingestion of onion significantly inhibited bone resorption [14,15,16]. A meal of fried onions or a meal of fried onions and fresh cherry tomatoes increased resistance of lymphocyte DNA-to-DNA strand breakage. In pharmacologic and *in vitro* studies, onion and onion extract, alone and in combination with other products, have shown haemostatic effects including inhibited platelet aggregation, reduced plasma viscosity, decreased hematocrit, and increased fibrinolytic activity [17,18]. In a clinical study of subjects with arterial hypertension, an onion-olive oil maceration product significantly decreased systolic blood pressure and also a trend towards a decrease in diastolic blood pressure [19].

Ethnomedicinal uses

Allium cepa is used in treatment of common ailments like cold, allergies, toothaches, laryngitis and cough. It is used for healing both internally and externally. A tint of onion is used in homeopathy to treat a variety of conditions such as diarrhea, facial paralysis, hay fever, hernia, laryngitis, pneumonia and trauma [20]. It has been recommended to treat bronchitis, whooping, asthma and other respiratory problems. A blend of rue and onion rids the digestive system of parasites. It stimulates the appetite; reduce arteriosclerosis by lowering blood cholesterol levels and prevent the formation of blood clots. Fresh onion juice is used to prevent microbial infections, removes warts, reduce superfluous skin blemishes when applied externally [21]. Dropping warm onion juice in the ear can comfort earaches.

The Roman Gladiator used onions for snakebites; prevent hair loss and firming muscles (http://www.herballegacy.com/peret_History.html). The doctors in North America prescribed onions for women in early stages for infertility and firming of muscles [22,23]. Allins present in onion can prevent the growth of malignant cells. Trials in the mid-nineties showed that onion could reduce the cardiovascular problems. 3-mercapto-2-methylpentan-1-ol attributes to antioxidant potent in onion inhibiting peroxy-nitrite induced diseases [24,25].

Health benefits of onion

Onion, an exceptionally strong antioxidant is full of plentiful anticancer compounds. It has been particularly allied to inhibit stomach and intestinal cancers, thins the blood, lowers cholesterol, raises good-type HDL cholesterol, and wards off blood clots. The leaves of the plant are aphrodisiac, anti-spasmodic, anti-helminthic, alterative, carminative, digestive, diuretic, emollient, expectorant, mild laxative, stimulant and tonic. Onion possesses pain-killing property. It is beneficial in the treatment of eye when its juice is mixed with honey. It is a valuable medicine for suppressing pain resulting from piles by consuming it daily or by applying an ointment made of onion, turmeric and Indian hemp in hot sesame oil [26].

Onions are known to contain anthocyanin and flavonoids. Mechanisms of action include free radical scavenging, chelation of transition metal ions, and inhibition of oxidases such as lipoxygenase [27]. The anti-oxidative effects in onion such as inhibition of lipid peroxidation and lowering of low-density lipoprotein (LDL) cholesterol level have been allied with condensed risk of neurodegenerative disorders, several cancers, cataract formation, ulcer development and cardiovascular diseases. 3-mercapto-2-methylpantan-1-ol (3-MP) in onion inhibits peroxy-nitrite-induced cytotoxicity, intracellular tyrosine nitration and intracellular reactive oxygen species [28].

Onions are anti-coagulant food having a truly wonderful ability to counteract the detrimental clot-promoting effects of eating fatty acids [5]. It acts as an effective remedy for cholera. Onion ground with pepper mixture allays thirst, vomiting, diarrhea and restlessness when consumed by a cholera patient. Research studies have proved that the onions affect the liver's metabolism of glucose or release of insulin or prevent insulin's destruction. The probable hypoglycemic substances in onions are allicin and allyl propyl disulfide. Onion is a mucus clearing food and has been for cold, cough, bronchitis and influenza [5]. Presence of essential oils like catechol, protocatechnic acid, thiocyanate, thiopropiono aldehyde and other micronutrients in onion avoid the peril of developing heart diseases and heart stroke. Intake of raw onion helps in healing tooth disorders. Its juice can be consumed, applied for curing ear infections, skin disorders, rheumatic diseases, urinary infections and bleeding piles. The aphrodisiac properties of onion increases libido and strengthens reproductive organs for sexual impotence [5]. Other pharmacological activities of onion include inhibition of carcinomas, immune-suppression and neuro-protective effects. It is highly effective against pathogenic gram-positive bacteria and dermatophytic fungi and also promotes beneficial microorganisms [1].

Conclusion

In rundown, the health benefits of dietary consumption of onions have been reviewed. Organosulfur compounds such as di-allylsulfide, thiosulfinates and flavonoids have been the spotlight of much research pertaining to antioxidant activity, cancer prevention, coronary heart disease, and many other factors relating to human disease. Researchers using epidemiological data have shown association between increased onion consumption and lower risk of certain cancers, lipid and cellular oxidation and subsequent damage to cellular function and overall health. Many promising aspects relating to high daily intake of onions have been explicated. However, it is perceptible that more research is still needed in order to clearly identify *in vivo* health benefits from onion consumption in the human diet.

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