

A Review: onion (*Allium cepa*)

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ABSTRACT:

The concept of cosmetics is as ancient as mankind and civilization. Various herbs are used in beauty products that look charming and young. Herbal cosmetics of onion (onion oil/onion juice/onion shampoo/onion serum) are nowadays widely used by the common people because of the concept of lower side effects with a better safety and security profile in hair growth. The present work was aimed at learning about onion benefits for hair growth and health. Healthy, lustrous hair is a common desire, and rightly so as it crowns your head. Cleaning and nourishing the hair and scalp are the basic requirements for a healthy mane, although hair damage and thinning still occur despite these measures. Your hair is constantly exposed to different environmental factors and pollution, which, along with increasing age and some lifestyle habits, can cause dandruff, premature greying, hair thinning, and even balding. When accompanied by poor hair growth, these hair problems can greatly affect your hair quality and growth. Fortunately, in most cases, the damage can be reversed with proper care and time. To encourage healthy hair growth, you may use natural ingredients that boost hair growth and recovery. One such combination that can work wonders on your hair is onion juice. Nature is a good friend of humans. Plants have been serving humanity for hundreds of years. Herbal/ayurvedic medicines are used for the treatment of several diseases without any harm. *Allium* species are one of the remedial herbs with bioactive parts, that act as medicinal plants and cure diseases, their roots stems leaves, and juices are valuable for human health. *Allium cepa* is studied for the treatment of cancer, cardiovascular disease, depression, inflammation, reducing blood sugar, baldness, gastric ulcer, colic diseases, oxidative damage, etc. Onion in combination with a variety of other herbs is used to increase its value and again enormous health benefits.

Onion is the product of the *Allium cepa* L. plant, the most cultivated species of the Alliaceae family. Genus *Allium* contains about 700 species of perennial plants consisting of underground storage rhizomes or bulbs.^[1] These species are widely distributed in North Africa, Europe, Asia, and North American regions. It is a short-duration horticultural crop (Brewster, 1990) grown at low latitudes. It is commonly known as the “Queen of the kitchen,” due to its highly valued flavor, aroma, unique taste, and medicinal properties of its flavor compounds. It has been valued as a food and a medicinal plant since ancient times. Onion is a major food component of various food cuisines. Onion is used throughout the year, for example in curries, in the form of spices, in salads, as a condiment, or cooked with other vegetables, such as boiled or baked. It is also used in different forms of processed food, e.g. pickles, powder, paste, and flakes, and it is known for its medicinal value. It is known by different vernacular names in different regions of the world.^[2]

It is known as:

- Onion (English)
- Oignon (French)
- Zwiebel (German)
- Cipolla (Italian)
- Basal (Arabic)
- Palandu / Pyaj (Hindi)
- Choong (Chinese)
- Piyaz (Urdu)^[3]

Allium cepa:

- Name: *Allium cepa*.
- Family: Liliaceae.
- Common names: Onion, bulb onion, common onion.
- Local names: Alubosa, Albasa, Yabase, Albasa gudaji.
- Useful parts: Leaves, Bulb.

I. INTRODUCTION:

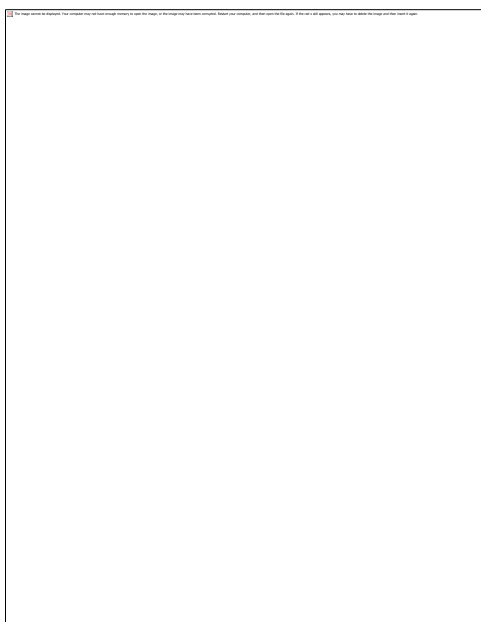


Fig.1. Scientific classification of onion.^[4]

Types:

- i. Yellow onion
- ii. Brown onion
- iii. Red onion
- iv. White onion
- v. Green onion
- vi. Shallots
- vii. Sweet onion

Common onions are available in yellow or brown, red, green, and white color varieties. Yellow or brown onions (called red in some European countries) are full-flavored and are the onions of choice for everyday use, with cultivars bred specifically to demonstrate this sweetness such as Vidalia, Walla Walla, Cévennes, and "Bermuda".^[5] Yellow onions turn a rich, dark brown when caramelized and give French onion soup its sweet flavor. The red onion (called purple in some European countries) is a good choice for fresh use when its color livens up the dish; it is also used in grilling. White onions are the traditional onions used in classic Mexican cuisine; they have a golden color when cooked and a particularly sweet flavor when sautéed.^{[6][7]} Green onion is also very useful to health, it reduces weight, and risk of cancer, promotes bone density, cures sore throat, prevents arthritis, holds antiviral properties, and leads to a healthy heart.



Fig 2 Different types of onion.^[8]

Varieties:

Multiplier Onion - Co- 1, Co- 2, MDU- 1, Agrifound Red

Small Common Onion - Agrifound Rose, Arka Bindu

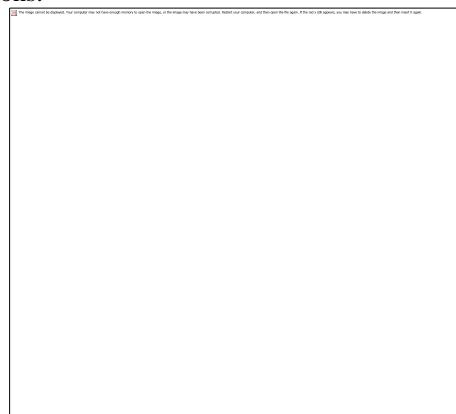
White Onion - Bhima Shubra, Bhima Shweta, Bhima Safed, Pusa White Round, Arka Yojith, Pusa White Flat, Udaipur -102, Phule Safed, N-257-9-1, Agrifound White.

Spanish Brown - Bhima Light Red, Bhima Kiran, Phule Suvarna, Arka Niketan, Arka Kirthiman

Red onion - Bhima Super, Bhima Red, Bhima Raj, Bhima Dark Red, Bhima Shakti, Punjab Selection, Pusa Red, N-2--4--1, Pusa Madhavi, Arka Kalyan, Arka Lalima.^[9]

History:

➤ Allium species have been cultivated in about 175 countries, for 5000 years. Wild varieties of onion are thought to have originated from Iran western Pakistan and Central Asia. According to ancient Egyptians, the "spherical bulb of onion is a symbol of the universe". The name is derived from the Latin word "unum" meaning "one". Onions have been considered a food source for millennia. Ancient Greek athletes believed that eating large quantities of onions would lighten their blood. In theages, the onions were used by people for paying rent. Columbus introduced onions to America in 1492 and is now cultivated in the world's temperate regions.^[10]



II. MORPHOLOGY:

Botany, Morphology, Ecology: *Allium cepa* is an annual plant, having fleshy bulbs growing below the soil. The plant contains white or purple colored tiny flowers. Onion has a shallow root system. A short, hollow, green, fattened stem is present at the base of the plant, which can attain a height of one meter (3ft). Leaves are green, hollow, and cylindrical. Thickening of the leaf bases forms a bulb, after a certain period of growth from the underside of the plate, a bundle of fibrous roots extends for a short way into the soil. As the onion matures, food reserves accumulate in the leaf bases, and the bulb of the onion swells.^{[11][12]}



Fig.3 Growth of onion plant

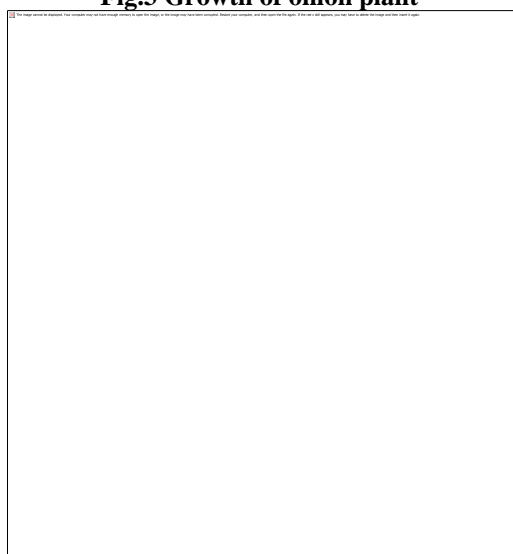


Fig.4 Morphology of onion^{[13][14]}

In the autumn, the leaves die back, and the outer scales of the bulb become dry and brittle, so the crop is normally harvested. If left in the soil over winter, the growing point in the middle of the bulb begins to develop in the spring. New leaves appear, and a long, stout, hollow stem expands, topped by a bract protecting a developing inflorescence. The inflorescence takes the form of a rounded umbel of white flowers with parts in sixes. The seeds are glossy black and triangular in cross-section. The average pH of an onion is around 5.5.

Well-drained, loamy, and stone-free soils; proper sunlight; appreciable quantities of essential minerals including nitrogen, potassium, and

phosphorous, are necessary for the growth of onions. Temperature also plays a crucial role in onion growth. Onions growing in hotter regions produce more sulfur compounds and in turn more pungent Odor.

III. ACTIVE COMPONENTS:

Onions are the richest source of water, proteins, vitamins (ascorbic acid and pyridoxine), fatty acids, carbohydrates, Fiber, potassium, flavonoids (anthocyanin, quercetin), and trace minerals (chromium). The pungent Odor of onions is because of the presence of sulfur compounds (allyl propyl disulfide). Many researchers reported that the antioxidant potential of onions is due to the presence of terpenes, flavonoids, carotenoids, phytoestrogens, polyphenols, and secondary metabolites (volatile constituents). GCMS analysis is generally used for characterization purposes of aromatic plant oil.^[19-20] Structures of important chemicals found in onion are shown in the figure. The lachrymatory principal is propane, which has a bitter taste and easily degrades into volatile constituents responsible for the characteristic aroma of onion. The bulb of *Allium cepa* contains small amounts of some anti-nutrients, which don't cause any toxic effects. It has a high percentage of minerals and, therefore, is used to cure various disorders including hypertension, rickets, and osteomalacia.^[18]

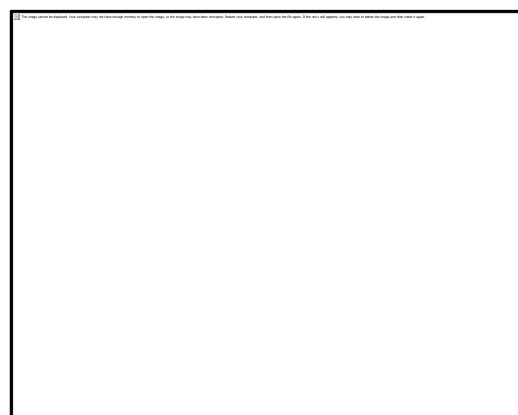


Fig.5 Structure of Anthocyanins^[21]

Composition:

Most onion cultivars are about 89% water, 9% carbohydrates (including 4% sugar and 2% dietary fiber), 1% protein, and negligible fat (table). Onions contain low amounts of essential nutrients and have an energy value of 166 kJ (40 kilocalories) in a 100 g (3.5 oz) amount. Onions contribute savory flavor to dishes without contributing significant caloric content.

Slimestad & al. noticed that onion bulbs (*Allium cepa* L.) are among the richest sources of dietary flavonoids and contribute to a large extent to the overall intake of flavonoids. This review includes a compilation of the existing qualitative and quantitative information about onion bulbs. In addition, a summary is given to index onion cultivars according to their content of flavonoids measured as quercetin.^[15]

Phytochemicals

Considerable differences exist between onion varieties in phytochemical content, particularly for polyphenols, with shallots having the highest level, six times the amount found in Vidalia onions. Yellow onions have the highest total flavonoid content, an amount 11 times higher than white onions. Red onions have considerable content of anthocyanin pigments, with at least 25 different compounds identified representing 10% of total flavonoid content. Onion polyphenols are under basic research to determine their possible biological properties in humans.

Flavonoids, Quercetin

Onion is the richest source of dietary flavonoids and contributes to a large extent to the overall intake of flavonoids. Two flavonoid subgroups are found in onion: the anthocyanins, which impart a red to purple color to some varieties, and the flavanols such as quercetin and its derivatives responsible for the yellowed brown skins of different varieties (Griffiths et al., 2002). Flavanols are the predominant pigments of onions. Only compounds belonging to the flavanols, the anthocyanins, and the di hydro flavanols have been reported to occur in onion bulbs. At least 25 different flavanols have been characterized, and quercetin derivatives are the most important ones in all onion cultivar



Fig.6 Flavonoids and quercetin structures present in *Allium cepa*.

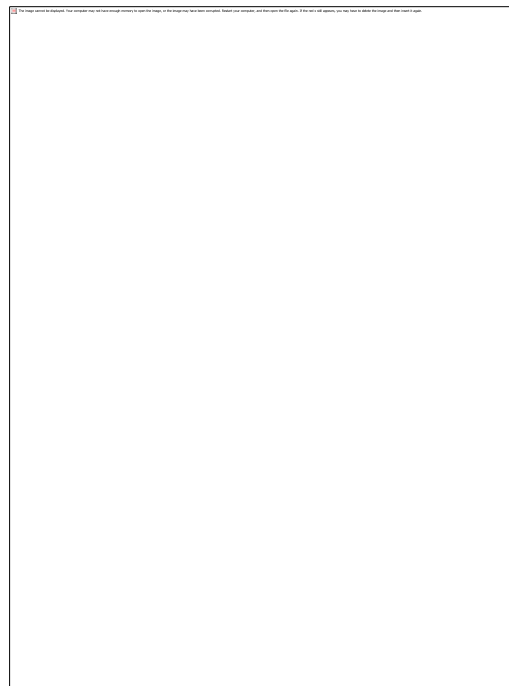


Fig.7 onion nutritional facts^[16]

IV. ONION BENEFITS FOR HAIR CARE AND HEALTH :

Onion juice may be effective for hair loss in some instances. It may also restore luster and shine. Onion juice could also prevent premature graying of hair and treat dandruff.

- Here's a full list of the claimed benefits of onion juice for hair care: alopecia treatment
- inflamed, dry, or itchy scalp



Fig.8 Onion juice^[22]

- hair loss
- dandruff
- thinning hair
- dry or brittle hair
- prematurely graying hair
- scalp infection
- Onion juice may be effective for hair loss in some instances. It may also restore luster and shine. Onion juice could also prevent premature graying of hair and treat dandruff.

While the onion is usually known for its strong smell, it may be the time that it's known for something else: its help in hair care. Researchers have found that the anti-inflammatory and antimicrobial properties of onions may help you grow your hair or enhance its healthy appearance.^[23]

➤ **Disorders of hair:**

The main problems associated with hairs are pigmentation (fading), dandruff falling of hairs (shedding), and balding. There are various disorders of hair, that cause hair loss.^[24] The term androgenetic alopecia is often used to describe the patterned loss of scalp hair in genetically susceptible men and women. Alopecia in these cases is characterized by thinning of hair as opposed to follicular loss, at least in the early stages.^[25] In androgenetic alopecia, shortening of the anagen phase and continuous miniaturization of sensitive hair follicles takes place resulting in the conversion of thin terminal hairs into fine vellus hairs. The 5 α -reductase type-2 enzyme plays a central role in the intra-follicular conversion of testosterone to di-hydro testosterone.^[26] Some degree of follicular miniaturization and consequential hair loss is universal and is considered a physiological secondary sexual characteristic. Several medical treatments aimed at arresting the progression of hair loss have become available in recent years, and surgical treatments are constantly being refined, which have many side effects therefore, to cope with the problem of hair loss, here we have looked into the nature's treasure and found several herbs with proven records for the treatment of alopecia.

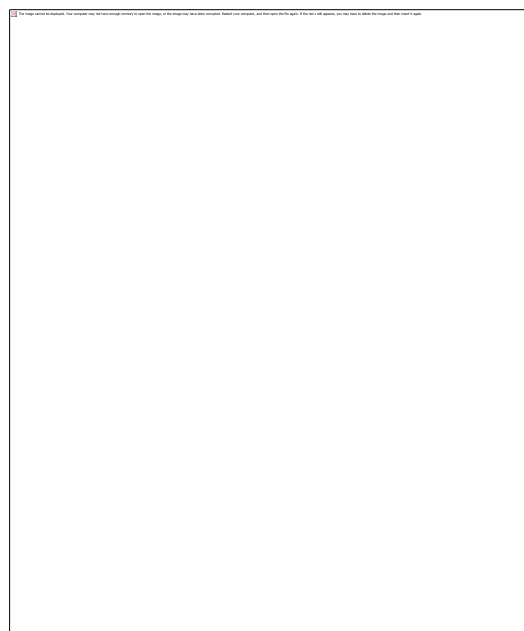


Fig.9 Major hair problems lead to hair loss.

➤ **Causes of hair loss:**

Management of hair loss:

Drugs, which claim to treat hair loss, target a steadily growing, multibillion-dollar market worldwide. Great opportunities are associated with pharmaceutical hair loss management, but still, there is no radical improvement in the availability of specific therapies. The status of treatment of alopecia is the result of recent advances in our understanding of its etiology and progression. Angiogenesis (through endogenous substances), androgen antagonism, vasodilation through potassium channel opening 5-alpha reductase inhibition, and modulation of hair cycle are the major non-surgical therapeutic strategies for hair growth promotion Minoxidil (useful in both male and female pattern baldness) and Finasteride (useful in male pattern baldness) are two US FDA-approved synthetic drugs finding concomitant use for treatment of androgenic alopecia, but their side effects have reduced their usage^[30]. The side effects associated with the use of these synthetic compounds include erythema, scaling, pruritus, gynaecomastia, dermatitis, itching, or skin rash.

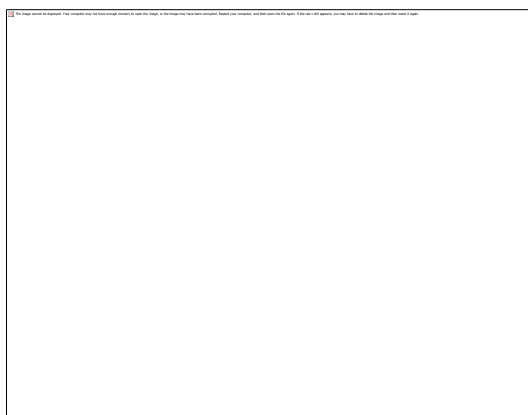


Fig 10 Common cause that promotes hair loss
[29]

Therefore, to cope with the problem of hair loss, here we have looked into nature's treasure and found several herbs with proven records for the treatment of alopecia. Being natural drugs there are many advantages of using them like patient compliance, fewer side effects, and more than one mode of action for treatment of alopecia. Topical application of biological response modifiers and anti-androgens are currently available therapies for the management of alopecia. However, the low success rate and associated adverse effects confine their use.^[31]

Natural products are considered fancy in cosmetics and numerous plant extracts have been examined concerning hair growth activity. There has been a steadily growing demand for plant-based medicines and cosmetics in recent days. In the traditional Indian system of medicine, many plants and herbal formulations are reported for hair growth promotion as well as for the improvement of the quality of hair, but the lack of sound scientific backing and information limits their use.^[32]

onion mainly contains protein (albumin), allyl propyl disulfide, diallyl sulfide, alliin, and alliin. It also contains some minerals like potassium, zinc, calcium, and magnesium. Onion has been reported beneficial in patchy baldness. The affected part should be rubbed with onion juice in the morning and evening until it is red. It should be rubbed with honey afterward. Zinc helps to secrete the scalp with much-needed oil and avoid dandruff that may cause hair loss. Iron is involved in the oxygenation of bodies.

INFORMATION ON THE HAIR-ENHANCING PROPERTIES:

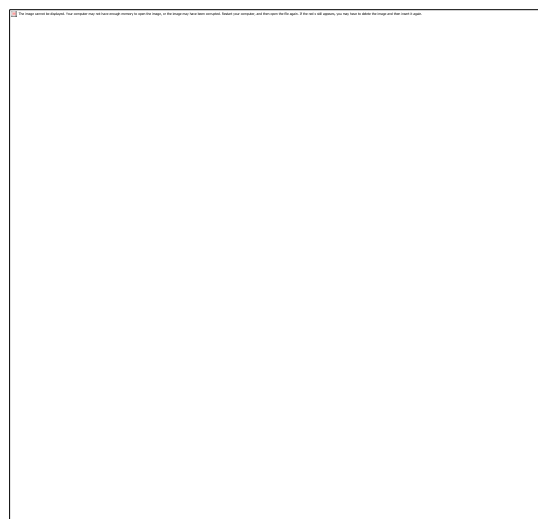


Fig.11 Benefits of onion juice [34]

➤ **To encourage hair growth:**

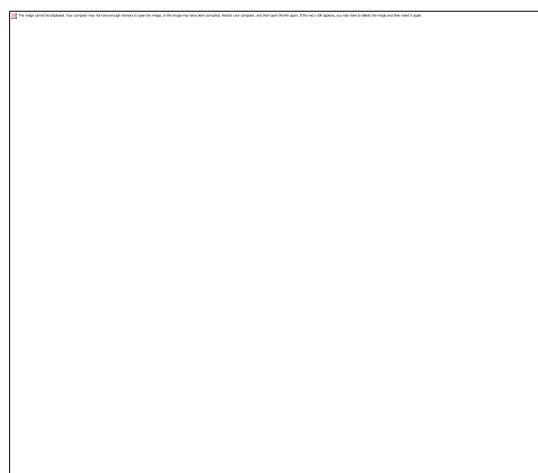


Fig.12 Hair-enhancing properties

A 2018 study published in the Journal of Drug Delivery and Therapeutics took a look at the onion's ability to improve hair growth.

The study's researchers created an onion shampoo by:

- gathering 100 grams (about 3.5 ounces) of fresh onion bulbs
- cutting them into small pieces
- Use a food processor to chop the onion into even smaller parts
- filtering the onion extract by pouring the chopped onion over a muslin cloth

They then added the onion extract (usually anywhere from 1 to 3 million Liters) to a natural shampoo of coconut, castor, and eucalyptus oils as well as cleansers.

They found when applied to the skin for 5 minutes (much longer than your usual shampoo), the mixture didn't irritate the skin. They also found that the onion shampoo

- provided more nutrients and better nourishment to hair follicles
- moisturized dry hair and scalp
- promoted hair growth

➤ **To reverse graying of hair:**

No peer-reviewed evidence exists on the concept of onions reversing the process of graying hair. However, a lot of home remedies promise onion extract can help reduce gray hairs. The idea behind these home remedies is that onions contain an antioxidant compound called catalase that helps reduce hydrogen peroxide at the hair roots. This is thought to keep the hair from turning Gray.

If you're willing to give this home remedy a try, here's a mixture that you can apply three to four times per week:

- Combine 3 tsp. onion juice with 2 tsp. lemon juice.
- Apply mixture to hair and scalp as evenly as possible.
- Leave on hair and scalp for 30 minutes.
- Rinse and use a mild shampoo to reduce any onion smells.

Alternatively, you can soak a cotton pad in plain onion juice and apply the juice to your scalp, massaging as you apply. Rinse with a mild shampoo after 15 minutes.

➤ **To moisturize and revitalize dry, brittle hair:**

Onions contain many compounds that may help to enhance dry, damaged hair.

Examples include flavonoids, such as kaempferol and quercetin. These have anti-inflammatory, antioxidant, and vasodilatory (widening of the blood vessels) properties that help promote blood flow to the scalp.

While admittedly there aren't a lot of commercial onion-containing hair care products on the market, you can find a few. These ready-made options can help you easily incorporate onion's benefits into your hair.

➤ **To calm a dry, itchy scalp:**

Onion's anti-inflammatory properties may help soothe an itchy scalp. You can also combine onion extract with other natural ingredients to calm your scalp.

Some combinations to try include:

- 2 tbsp. onion juice and 1/2 tbsp. raw honey
- 1 tsp. olive oil and 3 tsp. onion juice
- 3 tbsp. onion juice, 5 tsp. coconut oil, and 1 tsp. lime juice

You can apply one of these combos to your scalp, then wash it away with a mild shampoo after about 20 to 30 minutes.

➤ **To treat alopecia:**

Alopecia areata is a hair condition that causes hair loss in patches.

In a 2014 study Trusted Source of 38 people tested the effectiveness of using onion juice to treat alopecia. The researchers had one group of people apply onion juice to their scalp twice a day, while a control group applied tap water.

After 6 weeks, 86.9 percent of those who applied onion juice noticed more hair growth. Only 13 percent of the tap water group noted hair growth.

The researchers concluded onion juice can be a good alopecia treatment.

➤ **To quell dandruff:**

Onion juice has antimicrobial and antifungal properties, which is why some natural health experts advocate for it as an infection treatment.

Many people experience dandruff due to a fungus called *Malassezia furfur*, so onion's antifungal properties could come in handy as a dandruff fighter.

Because there isn't a lot of research on onion as a dandruff fighter, though, it's not a first-line treatment for moderate to severe dandruff. If you have the occasional flakes, however, you could try applying onion juice to your scalp.

You can also experiment with potential dandruff-fighting combinations. Examples include:

- grinding 2 tbsp. fenugreek seeds and soak them in 2 tbsp. onion juice and water to make a paste, then apply to your scalp for 30 minutes before rinsing off
- mixing 2 tbsp. aloe vera gel and 3 tbsp. onion juice, then apply to your scalp for 10 minutes before rinsing off

If your hair is super smelly after using an onion juice preparation, you can follow up with a mild shampoo and apple cider vinegar rinse. To do this:

- Pour 2 tbsp. apple cider vinegar into 1 cup water.
- Rinse the solution through your hair when you finish showering.^[35]

V. POSSIBLE ADVERSE EFFECTS USING ONION ON YOUR SKIN:

Using onions on your skin isn't a good idea if you're already allergic to the onions you eat. Steering clear may help you avoid further allergic reactions. Also, if you have sensitive skin, it's possible that onion juice could irritate it. The key is not to leave it on too long. This means keeping it on overnight is a no-no if you happen to have sensitive skin or a sensitive scalp.

As with any product or treatment, if onion extract irritates you, stop using it.

VI. KEY TAKE AWAYS:

You can use onions to improve your hair in lots of ways. These include reducing dandruff and potentially promoting hair growth.

When you're feeling crafty or experimental, try some of the DIY onion hair care recipes included in this article and see if you can reap onion's hair-boosting effects.

VII. GENERAL USES:

Onion consumption is effective for the treatment of many diseases including common cold, cough, allergy, laryngitis, and toothaches. It has been used externally as well as internally for healing purposes. A tint of onion is used in homeopathy to cure various ailments like hay fever, trauma, hernia, facial paralysis, and pneumonia. It has also been used for the treatment of respiratory conditions such as asthma, bronchitis, and whooping. A mixture of onion and rue is used to relieve the digestive tract from parasites. It increases appetite; lowers blood levels of cholesterol and in turn reduces arteriosclerosis. Onion juice is used to cure snakebites, promote hair growth, and strengthen muscles. Allin's found in onion prohibit the growth of infectious cells. Onions can prevent cardiovascular conditions.^[36]

VIII. BENEFITS OF ONIONS:

Scientists have linked onions to many health benefits, with most of them coming from the antioxidants in onions. Research shows that one particular antioxidant, called quercetin, protects health in several ways, such as fighting inflammation and boosting the immune system. Onions are also a good source of vitamins, minerals, and fiber.

Some other health benefits of onions include:

1. Lower risk of cancer:

Many kinds of onions contain chemicals that can help fight cancer. One study found that people who ate the most onions were the least

likely to have cancer of the colon, throat, and ovaries. Another showed that men who ate the most vegetables of the allium family were the least likely to have prostate cancer. They're also one of the richest food sources of quercetin, which is an antioxidant known to block some cancer-causing elements. A diet full of quercetin has been associated with a lower risk of developing lung cancer. Some researchers believe that the antioxidants in onions are responsible for their cancer-fighting properties.

2. Antibacterial action:

Onions may kill a wide range of bacteria, according to some research. In one experiment, onion and garlic extracts slowed the growth of several microbes. More research is needed to show how onion affects bacteria in the body.

3. Digestive health:

Onions have fructooligosaccharides, substances that act as prebiotics (food for your gut's healthy bacteria), which can help with digestion. They pass through the small intestine and feed the healthy bacteria in the large intestine. Diseases ranging from diabetes to colon cancer and depression have been tied to not having enough healthy gut bacteria.

4. Bone health:

Onions may play a role in preventing osteoporosis, a condition that weakens your bones. One study in people near or past menopause found that those who ate onions daily had greater bone density, resulting in stronger bones.

5. Lower risk of heart disease and stroke:

Onions contain organic sulfur compounds, which give them a sharp, strong taste and smell. These compounds can help reduce the level of cholesterol in your body and may help break down blood clots, lowering your risk for heart disease and stroke. You should eat onions raw rather than cooked to get the most sulfur compounds from them.

6. Diabetes control:

Both quercetin and organic sulfur compounds found in onions are known to boost insulin production, making them a helpful vegetable choice if you have diabetes.

7. Lower risk of Alzheimer's disease:

Flavonoids come from plants and are found in large amounts in onions. One study found

that a long-term diet high in flavonoids decreases the risk of Alzheimer's disease

IX. PHARMACOLOGICAL ACTIVITY:

1. Anti-diabetic activity:

A study was conducted to examine the anti-diabetic potential of *Allium cepa* using male albino rats. Oral administration of *Allium cepa* at the dose level of (0.25 g/kg w.r.t. body weight) significantly decreased the blood level of sugar in both fasted and fed animals. The extract does not produce any adverse effect at a dose of 0.25g/kg w.r.t. body weight. In another study, onion fraction (ether soluble) showed a significant decrease in blood glucose level, when orally administered at a dose level of 0.25mg/kg, in rabbits.^[37] A sulfur compound (S-methyl cysteine sulphoxide) isolated from onion extract showed a remarkable hypoglycaemic effect at a concentration of 0.2g/kg (w.r.t. body weight), in alloxan-induced diabetic animals.^[38] S-allyl cysteine sulphoxide (isolated from *Allium cepa*) lowered the glucose level of blood, in dose dose-dependent manner, in hypoglycaemic rats.^[39]

2. Hepatoprotective activity:

The hepatoprotective effect of *Allium sativum* and *Allium cepa* was studied against Cd (cadmium) induced hepatic damage in rats. Cadmium sulfate was orally administered at a dose of (1.5mg/kg daily), to induce hepatic damage. Cd caused a sharp increase in glutathione S-transferase and lipid peroxidase. While, liver levels of superoxide dismutase, catalase, and glutathione were lowered. *Allium sativum* (moderate dose level) and *Allium cepa* (high dose level) extracts significantly reduced lipid peroxidation and stimulated antioxidant defense in rat livers.^[40] In another experiment, the dehydrated onion powder was investigated for its hepatoprotective potential using hypercholesterolemic rats. Administration of varied doses of onion powder for six weeks significantly attenuated the serum cholesterol and LDL levels. Whereas, blood levels of vitamin C, vitamin E, and Glutathione were elevated.^[41] Another study was conducted to examine the hepatoprotective activities of onion extracts against 2,2'-azobis dihydrochloride-induced oxidative stress, in Sprague-Dawley rats. Chromatographic analysis suggested higher concentrations of quercetin aglycone in fermented onions than in fresh ones. Free radical quenching assay was used to examine the effect of quercetin aglycone, in vitro. Treatment resulted in elevated levels of GSH, glutathione reductase, and catalase.

Whereas, glutamate oxaloacetate transaminase, glutamate pyruvate transaminase, and thiobarbituric acid were decreased.^[42]

3. Anti-depressant activity:

Researchers found that elevated amounts of oxidative species cause depression and anxiety, which can be attenuated using *Allium cepa*. Polyphenols found in *Allium cepa* prevent CNS from anxiety and depression.^[43] An experiment was performed to evaluate the anti-depressant activity of onion powder, using the forced swimming test (FST) model, in rats. Fourteen days of daily administration of *Allium cepa* powder at doses of 0.05g/kg (w.r.t. body wt.) showed moderate antidepressant activity. Quercetin was found to be responsible for the antidepressant potential of *Allium cepa*.^[44]

4. Anti-pathogenic activity:

Antifungal potential of *Allium cepa* and *Allium sativum* extracts (aqueous) was tested against 25 strains of *Malassezia furfur*, 18 strains of *Candida albicans*, 12 strains of other *Candida* species, and dermatophyte species (35 strains), using agar dilution model. Ketoconazole (KTZ) was used as a standard drug. Both extracts and Ketoconazole strongly inhibited the tested fungal strains, in a dose-dependent behavior.^[45] Aqueous extract of *Allium cepa* was investigated for its antifungal effect against two dermatophytes (*Trichophyton mentagrophytes*, *Trichophyton rubrum*), with special reference to their morphology. Dose-dependent (>3.12%) inhibitory effect was shown against both fungi. *Allium cepa* extract affected the morphology of both dermatophytes by disrupting their plasma membranes and other cellular structures. *Trichophyton mentagrophytes* were found to be more affected than *Trichophyton rubrum*. Antimicrobial effects of garlic and onion (red, yellow, and green) essential oil extracts at doses of (50, 100, 200, 300, and 500 ml/l) were evaluated against two bacterial strains (*Staphylococcus aureus* and *Salmonella Enteritidis*) and three fungal strains (*Fusarium oxysporum*, *Aspergillus Niger*, and *Penicillium cyclopium*). A significant inhibitory effect was shown by the extracts (garlic and red onion) against *Salmonella Enteritidis*, whereas, *Staphylococcus aureus* showed less sensitivity towards extracts. In the case of fungal strains, the maximum inhibitory effect was shown against *Aspergillus Niger* and *Penicillium cyclopium*. However, *Fusarium oxysporum* was less sensitive towards extracts. The antimicrobial potential of garlic was higher than onion.^[46] In another study, it was demonstrated that

sulfur-containing compounds of onion prevent microbial growth and pro-inflammatory messengers.

5. Anticancer activity:

Cancerous-related health problems including gallbladder, oesophageal, cervical, ovarian, and breast cancers, are spreading worldwide. The disease is associated with nutrient-deficient food, fatness, less intake of fiber, concentrated sugars, etc., which can be prohibited using *Allium* species.^[47] Researchers concluded that cancer-preventing properties of *Allium* species are due to the presence of organo-sulfur compounds.^[48] In a study, it was shown that the consumption of onion and garlic may have inhibitory effects against tumors. In another study, it was demonstrated that onion has a higher anticancer potential than garlic.^[49] Hot air, vacuum, and freeze-dried onion powder have been reported to prevent the growth of leukemia cells by scavenging free radicals.^[51]

6. Hypo-lipidemic activity:

Hypercholesterol has been positively associated with cardiovascular disorders and obesity.^[52] In a study, dehydrated onion extracts significantly decreased the levels of LDL (low-density lipoprotein), in rat serum. While, concentrations of α -tocopherol, vitamin C, and glutathione in the blood of model animals were increased.^[53] In another study, the onion extracts reduced TC (total cholesterol), TAG (triacylglycerols), and LDL (low-density lipoproteins) cholesterol, but enhanced the level of HDL (high-density lipoprotein) cholesterol, in rat's serum.^[54] Above mentioned reports suggested that the incorporation of onions in dairy foods may lead to a reduction in serum cholesterol levels.

7. Cardio-protective activity:

Onions (raw or moderately cooked) are used to prevent cardiovascular disorders. Bitterness is positively linked to cardioprotective activity. Overheating leads to the instability of sulphur-containing compounds and in turn reduces both bitterness as well as anti-aggregatory properties.^[56] In a study, Methanol extract of onion showed cardioprotective effect against Ischemic heart damage and hypoxia-induced apoptosis, in rats (in vivo, in vitro). Onion extract prevented ROS formation, depolarization of mitochondrial membrane, and cytochrome c liberation, at a dose level of 500mg/ml, in vitro. While extract at a dose level of 10g/kg, significantly decreased the

myocardial infarct size, apoptosis, and plasma MDA (malonaldehyde) level, in vivo.^[57]

X. CONCLUSION:

Onion is an important constituent in our daily diet and is also useful for hair and health problems. Onions are rich in sulfur, which helps improve blood circulation to the scalp. This increased blood flow nourishes the hair follicles, promoting hair growth and reducing hair thinning. The sulfur also strengthens the hair shaft, making it less prone to breakage. This helps reduce hair fall minimize hair loss and increase hair growth. Onions are high in vitamin C, which may help regulate your immune health, collagen production, and iron absorption. It's also a powerful antioxidant that could help protect your cells from unstable, damaging molecules called free radicals. Onions are rich in B vitamins, including folate and vitamin B6. These play key roles in metabolism, red blood cell production, and nerve function. Cardio-protective, hypo-lipidemic, anti-pathogenic, anticancer, anti-depressant, hepatoprotective, and anti-diabetic activity, which is beneficial for health.

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