



## A Comprehensive Review on *Allium Cepa* Linn (Onion)

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### ABSTRACT:

Natural resources have its wide spread throughout this earth surface in various forms like plants. Herbs are always noted to be a wonderful saviour for mankind for treating various diseases and disorders. One of the common household found in all kitchens of Indian family is onion. It is a perennial herb, scientifically known as *Allium cepa*, of liliaceae family. It is rich in various phytoconstituents and known to treat various problems. This comprehensive review highlights about the plants pharmacognostical, phytochemical and pharmacological properties.

### 1. INTRODUCTION

Because it is a necessary component in the majority of Asian cuisines, the onion (*Allium cepa*) is referred to as the "Queen of the Kitchen"[1]. The perennial herb *Allium cepa*, often known as the onion, has its stem in the subterranean bulb. The common onion is a member of the Liliaceae family, while other authors refer to it as the *Alliaceae*. It has one or two leafless flower stalks that can grow to be 75–180 cm (2.5–6 feet) tall. Most commercially grown plants are grown from their thin, black seeds. More than 6000 years have passed since *A. cepa* was first farmed and used as a fertiliser. The vitamins B<sub>2</sub>, C, and B<sub>1</sub> as well as the minerals potassium and selenium can all be found in onions. They have the ability to treat stomach cancer, CVDs, and diabetes. Biochemically effective hypertrophic scar and keloid prevention revealed by onion peel. Studies have shown that onion extract is also effective for healing hypertrophic wounds. The risk of colon, lung, liver, brain, stomach, ovarian, prostate, and breast cancer is reduced by regular consumption of onions. Genotype, climate, and vegetable storage time all have a substantial impact on antiplatelet function[2]. The majority of *Allium*'s biological effects are linked to the sulphur-containing "thiosulphinates" that are unique to the plant and are also what give it its very pungent flavour and odour[3]. Onions have a comparatively low level of non-volatile sulphur compounds of L-cysteine, L-cystine, and L-methionine, which are S-containing amino acids without substitution. The *Allium cepa* plant's pharmacological and pharmacognostic

characteristics are the main topics of this review[4]. The onion is a tunicated bulb that can be compressed, round, or oblong in shape. It has a shiny, thin, dry membrane that might be reddish or white in colour. It has a milder flavour than garlic, a hint of sweetness, and an odd, well-known odour. Onion bulbs come in a variety of sizes and forms but are typically spherical, with juicy layers[5].

### 2. PLANT PROFILE

SCIENTIFIC NAME: *Allium cepa* linn



Figure no 1. *Allium cepa* linn

### 3. TAXONOMICAL CLASSIFICATION [5]

Kingdom: Plantae  
Division: Magnoliophyta



Class: Liliopsida  
 Order: Asparagales  
 Family: Alliaceae  
 Genus: *Allium*  
 Species: *A. cepa*  
 Edible parts: leaves, flowers, seed, root.

#### 4. VERNACULAR NAMES [6]

English: Onion  
 Hindi: Pyaz  
 Telugu: Ullipaya, Yerra gaddalu  
 Sanskrit: Polanduh  
 Kannada: Niruli  
 Tamil: Venkayam, Ulligadda  
 Malayalam: Cyvannulli  
 Marathi: Kanda  
 Gujarati: Dungri/Kanda

#### 5. DISTRIBUTION

The cultivation of *Allium sativum* is thought to have first appeared in Central Asia, from where it has since migrated throughout Southwest Asia and the Mediterranean region[7]. The output of onions worldwide has expanded over the previous 10 years by at least 25%; with its present annual production level of over 44 million tonnes, onions are the second-most significant horticulture crop after tomatoes[4].

Currently grown in more than 175 nations, onions are thought to have originated in Afghanistan, Iran, and the USSR[7].

It is a perennial or biennial plant that thrives in both warm and cold climates, grows up to 70 cm and can be found throughout South West Asia in soils ranging from dry to moist and mineral-based. Onions require particular environmental factors for their best growth, including soil that is free of stones, loamy, sunny, excellent for drainage, well-irrigated and rich in nitrogen, phosphorus, and potassium for maximum output[8].

#### 6. HABITAT

Even while small bulbs or transplants are frequently used, the majority of commercially grown onions are grown from the plant's thin, dark seeds, which are put straight in the ground. Because they are incredibly hardy, onions may grow well in a range of environments. Warmer temperatures are typically more mild and sweet than other locations, but the bulbs differ in size, form, colour, and pungency[2].



Figure no 2. Habitat of *Allium cepa* Linn

#### 7. BOTANICAL DISCRPTION

Typically found in Southeast Asia, the perennial herbaceous plant *Allium tuberosum* blooms in the late season. The plant sometimes goes by the name "garlic chive" due to the slight garlic flavour of the leaves. The bulb remains attached to the fleshy, robust rhizome, which produces 4–9 leaves, and the grey-green foliage, which can grow to a height of 10–20 inches. The 4–6 m long bulbs have a cylindrical shape. Because of their mild garlic-like flavour, leaves are employed in meals that aren't cooked. Summertime sees healthy plant growth, and wintertime sees them wither. In late July or the beginning of autumn, flowers bloom. The 3-2 foot-tall branch above the leaves appears to be home to a group of butterflies. White flowers in the shape of stars have a light aroma that draws a variety of pollinators, which helps them reproduce[9].

##### 7.1. LEAVES

It is a fibrous adventitious perennial herb with a stem in an underground bulb. The underground bulb, which is fleshy and cylindrical, has a base of sheathing-covered leaves and parallel venation[2]. Up to 40 cm tall and 20 mm in diameter, the leaves are bluish-green, 4 to 9 cm in diameter, hemispherical, packed and profusely flowered. Pedicels are 40mm long and equal, with filaments that are 4-5mm in diameter on the outside and nearly 2mm broad on the inside. Stamens are also protruding from the side of the pedicels. The dried leaf scales of the bulbs have a thick, big-celled epidermis, thin, light-spotted cell walls, and cells that are longitudinally elongated. The hypodermis beneath the epidermis runs perpendicular to the epidermis and it has thick, massive calcium oxalate crystals along the cell walls. A fresh leaf's scales are identical to those of a dry leaf, but a fresh leaf has larger calcium oxalate crystals in the hypodermis, fewer stomata, spiral vascular elements in the mesophyll, and larger cell nuclei on the dorsal side of the epidermis than on the ventral side[8].



## 7.2. FLOWER

From the peduncle apex, which is the same for all blooms, pedicels are all the same length. Flowers are little, complete, blonde, bracteate, actinomorphic, and protandrous. They are also ebracteolate and bracteate. Six tepals are present, organised in two whorls of three each, and are white. They are syntepalous, indicating valvate aestivation. There are six stamens, which are apostamenous, epitepalous, and located opposite the tepals. They are grouped in two whorls of three each. The gynoecium is syncarpous and tricarpellary, with two ovules in each of the three locules of the superior trilocular ovary on axile placentation. The anthers are ditheous and dehiscent longitudinally[8].

## 7.3. FRUIT

A loculicidal capsule is a fruit. Its endospermous seed[2].

## 7.4. SEEDS

Seeds or clump division can be used to propagate the plant. Flowers should be removed as soon as they blossom since seeds might lead to unchecked growth. Black, triangular seeds with a hard capsule at the centre are the fruits[9].

## 8. TRADITIONAL USES:

- Garlic has historically been used as an expectorant, to cure asthma, as an antipyretic, sedative, aphrodisiac, diuretic, emmenagogue, to encourage hair growth, to treat dyspepsia, urinary and respiratory tract infections, and to treat cardiac complaints[7].
- *A. fistulosum* has been widely used in China to treat a variety of diseases. In terms of plant components, the majority of diseases can be treated using whole plants and roots. This plant has reportedly been used to treat a variety of diseases, including cephalgia, arthritis, digestive issues and respiratory and digestive system disorders, according to ethnomedical documents[10].
- The essence of *A. cepa* spread to ancient Greece where athletes used it to purify their blood. Gladiators used to rub onion juice on their muscles to stiffen them up during the assault of Rome. It was consumed by Greek and Phoenician sailors to ward against scurvy[11].
- Ayurveda, Siddha, and Unani all make reference of it. In India, it was utilised in the sixth century as a vegetable, spice and medicine. It is frequently utilised in low-growth or developing nations and it is now used as a conventional treatment for a number of illnesses[12].

## 9. MEDICINAL USES

Because onions contain anti-inflammatory compounds, they can lessen the severity of symptoms brought on by illnesses such respiratory congestion brought on by colds, the pain and swelling of osteo- and rheumatoid arthritis and asthma's allergic inflammatory response. In addition to their vitamin C and quercetin, onions also contain other active ingredients called isothiocyanates that have anti-inflammatory properties, making them a healthy addition to soups and stews throughout the cold and flu season. For the treatment of coughs, colds, asthma, bronchitis and to relieve hoarseness, the WHO advises using fresh onion extracts. Also recommended by the World Health Organisation is the usage of onions to cure and prevent atherosclerosis as well as appetite loss. The regular eating of onions reduces blood pressure, serum levels of cholesterol and triglycerides while raising HDL levels, just like garlic does. Because of this, it lowers the chance of having a heart attack or stroke and avoids atherosclerosis and diabetic heart disease. The risk of heart disease is thought to be reduced by a select few vegetables, including onions. Its vitamin B6 is responsible for this advantageous effect because it decreases homocysteine levels, a significant risk factor for heart attacks and strokes. Due to the sulphur in onions, they naturally prevent blood from clotting. In order to balance the blood's pH in ancient Greece, enormous amounts of onion were consumed. In the colon, *Bacillus subtilis*, *Salmonella*, and *E. coli* are suppressed by the high fructo-oligosaccharide content of onions while the growth of beneficial bacteria is stimulated. In particular, the sulphides in onion extracts prevent the growth of stomach and colon cancers (13).It is also used as Avoiding DNA deterioration and mutations, Increased anti-cancer drug bioavailability, Cleanup and eradication of carcinogens,Regulation of tumour development and cell proliferation,Preventing the production of DNA adducts, Improvement in cancers' chemotherapeutic responses, Preventing the production of substances that cause cancer, Deactivation of substances that cause cancer,An uptick in DNA repair , Improvement of behavioral and memory deficiencies Improvement of motor incoordination, number 11, Improving learning and short-term memory, Diminished size of cerebral infarct[14].

## 10. PHARMACOLOGICAL USES

Numerous pharmacological effects of *allium cepa* have been discovered, including analgesic, antifungal, antiasthmatic, antiascariasis, antibacterial, anticonvulsant, antihyperglycemic, antihistamine, antifilarial, and antiedema effects[15].



## 11. CHEMICAL CONSTITUENTS

The primary characteristic of *A. cepa* is a significant oil that contains higher concentrations of mono, di, tri, tetra-sulphides, thiophene, and thiol derivatives. Onion bulbs and leaves are rich in cyaniding glycosides, prostaglandins, quercetin, other flavonoids, sterols, phenolic compounds, catechol, protocatechuic acid, and diosgenin, which are all present in the dried brown outer scale. Along with selenium, onions also contain quercetin, flavenols, allylsulfides, organosulfur compounds, cycloallin, fructose, quercetin-3-glucoside, and isohamnetin-4-glucoside, as well as sulfonates, xylose, galactose, glucose, and mannose [8].

## 12. PHYTOCHEMICAL STUDIES

The medicinal plants have some chemical substances that are physiologically active and operate on the human body. They go by the name of phytochemicals. Alkaloids, tannins, flavonoids, carbohydrates, terpenoids, and steroids are the most significant of these bioactive components found in plants. These

substances are produced by primary or alternative metabolism of living organisms[16]. *Allium cepa*'s phytoconstituents include sugar, water, protein, carbohydrate, minerals, fibre, vitamins, and fat. They also include a variety of secondary metabolites, including flavonoids (such as quercetin, kaempferol, and anthocyanins), volatile and non-volatile organosulfur compounds, sterols and saponins. Chemical assays that are qualitative can identify different phytochemicals. The *Allium cepa* L. extract contains a variety of phytoconstituents. Using several organic solvents, including methanol, ethanol, and aqueous, phytochemical screening is determined and examined. A phytochemical analysis revealed the presence of flavonoids, terpenoids, glycosides, saponins, fructans, alkaloids, glycosides, saponins, tannins, anthocyanins, organosulfur compounds, etc. in the *Allium cepa* bulb extract[12].

Onion contains mostly saponin, quercetin, and anthocyanin as phytochemicals. The following describes the various phytochemicals' structures[17].

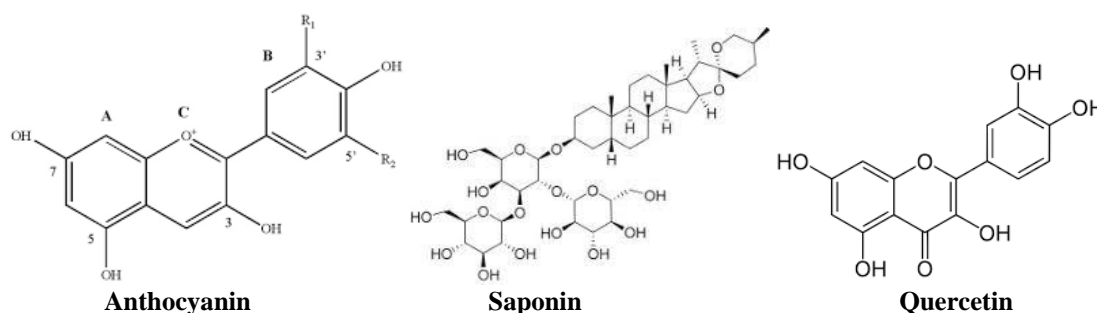


Figure no 03. Phytoconstituents(17)

## 13. PHARMACOGNOSTICAL STUDY

### 13.1. Macroscopical Study

A short shoot-root axis and a long cotyledon make up the embryo, which is crescent-shaped or wrapped in a spiral and has a little distinctive aroma. The seeds are irregularly wrinkled, triangular, about 3mm long and 1mm wide, convex on one side and flattened on the other, and covered in a black seed coat[18].

### 13.2 Microscopical Study

Fresh bulb fruit from *Allium cepa* was examined under a microscope and revealed to have stomata, upper and lower epidermis, vascular tissue including xylem and phloem, palisade tissue, cork cells, starch grains, and calcium co-oxalate crystal[15].

The transverse section of the seed displays an elongated to triangular shape; the seed coat is covered in dark black, hyper pigmented, unevenly deposited thick walled cells with wavy walls of epidermal cells; this is followed by a few layers of thin walled elongated parenchyma cells; the endosperm is composed of a few

to several layers of thick walled, hard, rectangular, compactly arranged parenchyma cells[18].

### 13.3. Powder Microscopy

Epidermal cells with strong walls and polygonal shapes filled with a dark reddish-black brown substance[18].

Stomatal index (inner) - 12.55

Stomatal index (outer) - 21.6

## 14. PHARMACOLOGICAL STUDIES

### 14. 1. CARDIOVASCULAR ACTIVITY

It is well known that onions and onion extracts lower blood pressure, promote fibrinolysis, increase platelet aggregation, and decrease blood lipid levels. For the enzymes cyclooxygenase and lipoxygenase, which

regulate eicosanoid metabolism (prostaglandins, thromboxanes and leukotrienes), onion oil has greater inhibitory activity when compared to garlic oil[11].

Consuming onions and garlic was also linked to reduce cholesterol and triglyceride levels. Due to the presence





of quercetin in onions, eating may also lower the risk of cardiovascular disorders. Low levels of cardiovascular disease are caused by the signalling of platelet aggregation being affected by high blood levels of quercetin[19].

#### 14.2. HYPOLIPIDIMIC ACTIVITY

Obesity and issues were discovered to have a good relationship with hyper-cholesterol[20]. dehydrated onion feed produces a decrease in the low-density lipoprotein of hypercholesterolemic rat serum, demonstrating the hypolipidemic activity of onion extract[21]. Additionally, the consumption of this food led to an increase in the blood levels of the antioxidants glutathione, ascorbic acid, and -tocopherol (vitamin E), which are thought to have significant anti-diabetic effects on the lipid metabolism issue[22]. Also observed the same outcome in rat serum. They claimed that while the high density lipoprotein cholesterol increased, the total cholesterol, triacylglycerol, and low density lipoprotein cholesterol decreased due to the higher content of onion extracts. Because onions have cholesterol-lowering properties, they can be used in regular meals to lower serum cholesterol levels[23].

#### 14.3. ANTIARTHRITIC ACTIVITY

Extract of onion skin showed the prevention of arthritis principal signs and reduces joint damage caused by CFA immune-mediate modulation monoarthritic arthritis induced in rats[24].

#### 14.4. ANTI-INFLAMMATORY ACTIVITY

Anti-inflammatory effects have been discovered in Ajoene, a natural component isolated from Allium[25]. An aqueous extract of the red onion bulb (EAC: 150 and 300 mg/kg) decreased lymphocyte and eosinophil counts in the blood and bronchoalveolar lavage fluid (BALF) in a rat model of asthma[26]. Another study found that *A. cepa* methanol extract (50, 250, and 500 mg/mL) decreased proinflammatory cytokines IL-1- $\beta$ , TNF- $\alpha$ , and IL-6 in lipopolysaccharide (LPS) treated BV-2 microglial cells, guarding against neuroinflammation[27]. The bulb extract from *A. cepa* (35, 70, and 140 mg/kg/day, 21 days) greatly decreased the overall WBC and pulmonary inflammatory cells, such as eosinophil, neutrophil, and monocyte numbers, however contributed to substantial increases in the number and the extract in the asthmatic Wistar rats[28]. *A. cepa* contains a number of flavonoids that may aid in the treatment of oxidative stress-related disorders, asthma, and mechanical and thermal hyperalgesia[29].

#### 14.5. ANTIOXIDANT ACTIVITY

Quercetin, a strong antioxidant, is found in onions. Numerous studies have demonstrated that quercetin may serve as a free radical scavenger and an inhibitor

of low-density lipoprotein oxidation. The red and white cultivars of *Allium cepa* shown antioxidant activity. *Allium cepa*'s quercetin-3'-O-beta-Dglucoside has antioxidant properties. Onion peel and flesh both increase the antioxidant status of old rats. In comparison to conventional medications, S-methyl cysteine sulfoxide from onions (*Allium cepa* Linn.) has anti-diabetic and antioxidant benefits in alloxan diabetic rats. Human cells with diabetes are shielded from oxidative DNA damage by dietary flavonols[30].

#### 14.6. ANTIFUNGAL ACTIVITY

It is commonly known that garlic and onions have antifungal properties[31]. The shape of *Trichophyton rubrum* and *T. mentagrophytes* is altered by onion aqueous extracts, which breaks cell membranes and other membrane-bounded structures [32]. Garlic has an active substance called ajoene, which has the potential to serve as a topical antifungal. When garlic and the medicine ketoconazole were tested on the fungi *Malassezia furfur*, *Candida* spp., as well as 35 strains of other dermatophyte species, it was discovered that both substances effectively inhibited the growth of fungal components. *Opalina ranarum*, *O. dimidicita*, *Balantidium entozoan*, *Entamoeba histolytica*, *Trypanosomes sp.*, *Leishmania sp.*, *Leptomonas sp.*, and *Crithidia sp.* are only a few of the protozoa that the garlic extract is effective against[33].

The crude extract of Persian shallot demonstrated fungistatic and fungicidal efficacy against pathogenic fungi, including *Candida albicans*, *Microsporium gypseum*, *Aureobasidium pullulans*, *T. mentagrophytes*, *T. rubrum*, *Fusarium oxysporum*, *Saccharomyces cerevisiae*, and *Aspergillus niger*. A flavonoid with the general formula  $C_{14}H_8O_8$  and the proposed name shalom is the active substance in charge of the antibacterial characteristics[17].

#### 14.7. ANTIMICROBIAL ACTIVITY

Studied nine distinct types of dermatophytic fungi as well as the growth inhibitory effects of onion oil on a variety of isolates of chosen Gram-positive and Gram-negative bacteria. One isolate of Gram-negative bacteria, *Klebsiella pneumonia*, was the only one that onion oil was shown to be particularly effective against, including *Bacillus anthracis*, *Bacillus cereus*, *Micrococcus luteus*, and *Staphylococcus aureus*[34]. The researchers also discovered that *Chrysosporium queenslandicum* and *Trichophyton mentagrophytes* both had their growth entirely stopped by 500 ppm, whilst *Microsporium canis*, *Microsporium gypseum*, and *Trichophyton simii* had their growth fully unaffected by 200 ppm of onion oil[35]. *Aspergillus flavus* and *Aspergillus parasiticus* var. *globosus* strains' fungal growth and aflatoxin production were also decreased by onion oil at various concentrations (100, 200, and 500



ppm) examined. Additionally, onions exhibited antibacterial activity against *Porphyromonas gingivalis* and *Prevotella intermedia*, which are thought to be the primary cause bacteria of adult periodontitis, as well as *Streptococcus mutans* and *Streptococcus sobrinus*, the main pathogenic bacteria for dental caries[36]. Onion extracts of two types (purple and yellow) were active in antimicrobial testing against 33 clinical isolates of *Vibrio cholerae*, with the purple type having a minimum inhibitory concentration (MIC) range of 19.2-21.6 mg/mL and the yellow type having a MIC range of 66-68.4 mg/mL[37].

#### 14.8. HEPATOPROTECTIVITY ACTIVITY

Besides the various positive effects of *Allium* reported above, onion flavonoids have shown significant hepatoprotective effects by protecting the liver from different ailments. Quercetin was reported to protect mouse liver from injury due to overloaded iron in hepatic cells. Anthocyanins have also been reported to protect the liver because anthocyanin cyanidin-3-O- $\beta$ -glucoside (C3G) was found to protect hepatic Gclc expression for the activation of protein kinase by increasing cAMP level resulting in phosphorylated element binding protein for Gclc transcription. Bioactive compounds are also found to have beneficial antiaging, antihypertension, and neuroprotective actions[38]. According to the studies previously mentioned, practically all of the bioactive components of onions have a variety of biological functions and health advantages. Quercetin and its derivatives, in particular, were described as the strongest bioactive chemicals for a larger health advantage against various infections and cancer. Additionally, flavonoids were the effective inhibitors of ROS to a greater degree. Furthermore, it can be inferred that the OSCs exhibited comparatively superior anti-inflammatory, antiallergenic, and antithrombotic activities.

#### 14.9. ANTI ASTHMATIC

In the past, onions were used to treat asthma. Their effects on asthma and other disorders like psoriasis and atopic dermatitis that are linked to elevated lipoxygenase products (leukotrienes) seem to be larger than garlic's. The overall result is comparable to cortisol, which blocks all eicosanoid metabolism by inhibiting phospholipase. The main causes of onion's antiasthmatic actions are probably its quercetin and isothiocyanate concentration, which inhibits the production of leukotrienes. In experimental studies, these effects have been demonstrated[19].

#### 14.10. ANTI OBESITY

A large rise in body weight or body mass index (BMI) is referred to as obesity[39]. Flavonoids and saponins

found in *A. cepa* are thought to have an inhibiting impact on pancreatic lipase[40]. According to the research, *A. cepa* uses active intermolecular compounds to limit the hydrolysis of lipid esters and display a protective effect against phospholipases. Additionally, *A. cepa* contains secondary metabolites including squalene, which stops the liver's 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase from producing cholesterol. Researchers found that giving *A. cepa* leaf extract at a dose of 4.5 g/kg body weight showed potential as an antihyperlipidemic drug because it reduced levels of triglycerides, total cholesterol, VLDL cholesterol, and LDL cholesterol that produces the antihyperlipidemic action. Quercetin and isoquercitrin, which are thought to be the components that provide *A. cepa* its antihyperlipidemic effects, are abundant in the plant[41].

#### 14.11. NEUROPROTECTIVE ACTIVITY

Methanolic extract of outer scales, edible portion of *A. cepa* bulb when administrated to mice before cerebral ischemia and reperfusion exhibit notable neuroprotection by noticeably reducing cerebral infarct size, remarkable decreasing, increase in thiobarbituric acid reactive substances concentration in brain mitochondria, supernatant fractions and preventing global cerebral ischemia reduced impairment of motor coordination and short term memory[42].

#### 14.12. ANALGESIC ACTIVITY

Adult Albino mice exhibited analgesic action in the hot plate, tail flicking, and acetic acid-induced writhing in response to the ethanol extract of *A. fistulosum* (200, 400, and 600 mg/kg). When compared to the control, the treatment of extract and regular aspirin (300 mg/kg) significantly (p 0.01) lengthened the delay time at 4 hours in both the hot plate and tail flick tests. The extract (600 mg/kg) and normal diclofenac sodium (5 mg/kg) were also found to significantly suppress the writhing response induced by acetic acid, with 50% and 46% inhibition[43].

#### 14.13. ANTIDIABETIC ACTIVITY

During a 28-day experimental study period, examined the antiobesity effects of onion extracts (3% and 5%) on Zucker diabetic fatty (ZDF) rats[44]. The ZDF rats' lipid profile and blood glucose levels were both considerably reduced by the onion extract. Three percent of onion extract was unable to exert its anti-diabetic benefits, whereas five percent of onion extract improved insulin sensitivity and reduced fasting blood sugar levels when compared to the control group. According to the study's findings, the presence of sulfur-containing chemicals in onions may help to reduce hyperlipidemia, glucose intolerance, and other conditions, as well as increase insulin sensitivity[45].



## 15. CONCLUSION

*Allium cepa* Linn is a common annual shrub freely grown in Indian gardens. It is wide spread all over the world. This review highlights the information on *Allium cepa* for phytochemical content and pharmacological properties. The allium cepa used to cure diabetes mellitus, CVDs, stomach cancer, cancer, inflammation, diabetes, hyperlipidemic, obesity. The present review shows the pharmacological activity of Cardiovascular activity, Hypolipidemic activity, Antiarthritic activity, Anti-inflammatory activity, Antifungal activity, Antioxidant activity, Antimicrobial activity, Hepatoprotective activity, Antiasthmatic activity, Antiobesity activity, Neuroprotective activity, Analgesic activity, Antidiabetic activity.

## REFERENCES

- Balkrishna, A., Chaudhary, M., Sharma, H., Srivastava, D., Kukreti, A., Kumar, A. and Arya, V., 2023. Phytochemistry, pharmacology, and medicinal aspects of *Allium fistulosum* L.: A narrative review. *Journal of Applied Pharmaceutical Science*. Vol. 40 No. 2.
- Marrelli, M., Amodeo, V., Statti, G. and Conforti, F., 2018. Biological properties and bioactive components of *Allium cepa* L.: Focus on potential benefits in the treatment of obesity and related comorbidities. *Molecules*, 24(1), p.119.
- Gadhavi, H.A. and Pandya, H., 2017. Phytochemical Screening of Antimicrobials from *Allium cepa*. *International Journal of Science and Research (IJSR)*, 6(7), pp.1499-1501.
- Singh Bora, K. and Sharma, A., 2009. Phytoconstituents and therapeutic potential of *Allium cepa* Linn. *A Review. Pharmacogn. Rev*, 3, p.170.
- Kumar, K.S., Bhowmik, D., Chiranjib, B. and Tiwari, P., 2010. *Allium cepa*: A traditional medicinal herb and its health benefits. *Journal of Chemical and Pharmaceutical Research*, 2(1), pp.283-291.
- Manasa, M., Kumar, S.M. and Vangalapati, M., 2014. A review on medicinal herb: *Allium cepa*. *gestion*, 7, p.8.
- Al-Snafi, A.E., 2013. Pharmacological effects of *Allium* species grown in Iraq. An overview. *International Journal of Pharmaceutical and health care Research*, 1(4), pp.132-147.
- Battagani Deepthi, Jada Naga Lakshmi, Rayadurgam Naveen May-June 2021. Review on Phytochemicals and Pharmacological Studies of *Allium cepa* (Onion). *Int. J. Pharm. Sci. Rev. Res.*, 68(1), Article No. 15, Pages: 85-91.
- Jannat, K., Rahman, T. and Rahmatullah, M., 2019. Traditional uses, phytochemicals and pharmacological properties of *Allium tuberosum* Rottler ex Spreng. *J Med Plants Stud*, 7, pp.214-220.
- Balkrishna, A., Chaudhary, M., Sharma, H., Srivastava, D., Kukreti, A., Kumar, A. and Arya, V., 2023. Phytochemistry, pharmacology, and medicinal aspects of *Allium fistulosum* L.: A narrative review. *Journal of Applied Pharmaceutical Science*. vol:13,p.10.
- Teshika, J.D., Zakariyyah, A.M., Zaynab, T., Zengin, G., Rengasamy, K.R., Pandian, S.K. and Fawzi, M.M., 2019. Traditional and modern uses of onion bulb (*Allium cepa* L.): a systematic review. *Critical reviews in food science and nutrition*, 59(sup1), pp.S39-S70.
- Barti, H., Shankar, G. and Singh, S., 2022. (*Allium cepa*) to study phytochemistry and health benefit. *Journal of Pharmacognosy and Phytochemistry*, 11(4), pp.245-257.
- Dr. Nitin Jain, Dr. Omprakash Sharma and Dr. Pratibha Chaudhary 2019: Medicinal uses of palandu (*Allium cepa* linn): A REVIEW ARTICLE. *World journal of pharmaceutical and medical research*. 5(1), 188-191.
- Kianian, F., Marefati, N., Boskabady, M., Ghasemi, S.Z. and Boskabady, M.H., 2021. Pharmacological Properties of *Allium cepa*, preclinical and clinical evidences; a review. *Iranian Journal of Pharmaceutical Research: IJPR*, 20(2), p.107.
- Singh, R., Tripathi, S., Gupta, D. and Pujari, N.M., 2022. Evaluation of Pharmacognostical Properties And Hair Growth Promoting Activity Of *Allium cepa*. *Journal of Pharmaceutical Negative Results*, pp.3768-73.
- Radovanović, B., Mladenović, J., Radovanović, A., Pavlović, R. and Nikolić, V., 2015. Phenolic composition, antioxidant, antimicrobial and cytotoxic activities of *Allium porrum* L.(Serbia) extracts. *Journal of Food and Nutrition Research*, 3(9), pp.564-569.
- Miri, S.M. and Roughani, A., 2018, October. *Allium* species growing in Iran: Chemical compositions and pharmacological activity. In *Proceedings of the First National Congress and International Fair of Medicinal Plants and Strategies for Persian Medicine that Affect Diabetes, October* (pp. 9-11).
- Raiza, A.J., 2021. Standardization of *Allium cepa* L. Seeds via Pharmacognostical, Physicochemical and HPTLC Finger Print Profile Studies. Volume 8, Issue 4.
- Pizzorno, J.E. and Snider, P., 2015. *Contemporary naturopathic medicine* (pp. 366-86).
- Vidyavati, H.G., Manjunatha, H., Hemavathy, J. and Srinivasan, K., 2010. Hypolipidemic and antioxidant efficacy of dehydrated onion in



- experimental rats. *Journal of food science and technology*, 47, pp.55-60.
21. Dennis, B., Aziz, K., She, L., Faruqui, A.M., Davis, C.E., Manolio, T.A., Burke, G.L. and Aziz, S., 2006. High rates of obesity and cardiovascular disease risk factors in lower middle class community in Pakistan: the Metroville Health Study. *J Pak Med Assoc*, 56(6), pp.267-72.
  22. Tabatabaei, S.R., Papahn, A.A., Jalali, M.R. and Rahimi, L., 2008. The effects of oral vitamin E on induction and consequence of experimental diabetes mellitus in rats. *Pakistan Journal of Biological Sciences: PJBS*, 11(4), pp.633-637.
  23. Sohail, M.N. Karim, A. Sarwar, M. and Alhasin, A.M. (2011). Onion (*Allium cepa* L.): An alternate medicine for Pakistani population. *International Journal of Pharmacology*. 7(6): 736-744.
  - 24 . Aiman Ummu, Khatimah Husnul, Ariiq Saifullah Muhammad, Carnegie Matondang Muhammad, Sukmana Dike Dandari, Anderiani Miskad Upik.,2020. Anti-Arthritic effect of onion skin extract on rat complete Freund's adjuvant-induced. *European Journal of Molecular and Clinical Medicine*. 7(7): 1183-92,ISSN 2515-8260.
  25. V. M. Dirsch and A. M. Vollmar, "Ajoene, a natural product with non-steroidal anti-inflammatory drug (NSAID)-like properties?" *Biochemical Pharmacology*, vol. 61, no. 5,pp. 587–593, 2001.
  - 26.Dawud, F.A., Dubo, A.B., Yusuf, N.W. and Umar, I.A., 2016. Effects of aqueous extract of *Allium cepa* (red onion) on ovalbumininduced allergic asthma in wistar rats. *Bayero Journal of Pure and Applied Sciences*, 9(2), pp.95-101.
  27. Jakaria, M., Azam, S., Cho, D.Y., Haque, M.E., Kim, I.S. and Choi, D.K., 2019. The methanol extract of *Allium cepa* L. protects inflammatory markers in LPS-induced BV-2 microglial cells and upregulates the antiapoptotic gene and antioxidant enzymes in N27-A cells. *Antioxidants*, 8(9), p.348.
  28. Ghorani, V., Marefati, N., Shakeri, F., Rezaee, R., Boskabady, M. and Boskabady, M.H., 2018. The effects of *Allium cepa* extract on tracheal responsiveness, lung inflammatory cells and phospholipase A2 level in asthmatic rats. *Iranian Journal of Allergy, Asthma and Immunology*, pp.221-231.
  29. Vazhappilly, C.G., Ansari, S.A., Al-Jaleeli, R., Al-Azawi, A.M., Ramadan, W.S., Menon, V., Hodeify, R., Siddiqui, S.S., Merheb, M., Matar, R. and Radhakrishnan, R., 2019. Role of flavonoids in thrombotic, cardiovascular, and inflammatory diseases. *Inflammopharmacology*, 27, pp.863-869.
  - 30.Lean, M.E., Noroozi, M., Kelly, I., Burns, J., Talwar, D., Sattar, N. and Crozier, A., 1999. Dietary flavonols protect diabetic human lymphocytes against oxidative damage to DNA. *Diabetes*, 48(1), pp.176-181.
  31. Chehregani, A., Azimishad, F. and Alizade, H.H., 2007. Study on antibacterial effect of some *Allium* species from Hamedan-Iran. *Int J Agric Biol*, 9(6), pp.873-876.
  - 32.Miri, S.M. and Roushani, A., 2018, October. *Allium* species growing in Iran: Chemical compositions and pharmacological activity. In *Proceedings of the First National Congress and International Fair of Medicinal Plants and Strategies for Persian Medicine that Affect Diabetes*, October (pp. 9-11).
  33. Palani, S., Joseph, N.M., Tegene, Y. and Zacharia, A., 2014. Medicinal properties of garlic—a concise review. *Current Research in Pharmaceutical Sciences*, pp.92-98.
  34. Zohri, A.N., Abdel-Gawad, K. and Saber, S., 1995. Antibacterial, antidermatophytic and antitoxigenic activities of onion (*Allium cepa* L.) oil. *Microbiological research*, 150(2), pp.167-172.
  - 35.Dzoyem, J.P., McGaw, L.J., Kuete, V. and Bakowsky, U., 2017. Medicinal spices and vegetables from Africa.(pp.353-361).
  - 36.Kim, J.H., 1997. Anti-bacterial action of onion (*Allium cepa* L.) extracts against oral pathogenic bacteria. *The Journal of Nihon University School of Dentistry*, 39(3), pp.136-141.
  37. Hannan, A., Humayun, T., Hussain, M.B., Yasir, M. and Sikandar, S., 2010. In vitro antibacterial activity of onion (*Allium cepa*) against clinical isolates of *Vibrio cholerae*. *Journal of Ayub Medical College Abbottabad*, 22(2), pp.160-163.
  - 38.Chernukha, I., Fedulova, L., Vasilevskaya, E., Kulikovskii, A., Kupaeva, N. and Kotenkova, E., 2021. Antioxidant effect of ethanolic onion (*Allium cepa*) husk extract in ageing rats. *Saudi journal of biological sciences*, 28(5), pp.2877-2885.
  39. Novelli, E.L.B., Diniz, Y.S., Galhardi, C.M., Ebaid, G.M.X., Rodrigues, H.G., Mani, F., Fernandes, A.A.H., Cicogna, A.C. and Novelli Filho, J.L.V.B., 2007. Anthropometrical parameters and markers of obesity in rats. *Laboratory animals*, 41(1), pp.111-119.
  40. Marrelli, M., Russo, C., Statti, G., Argentieri, M.P., Meleleo, D., Mallamaci, R., Avato, P. and Conforti, F., 2022. Phytochemical and biological characterization of dry outer scales extract from Tropea red onion (*Allium cepa* L. var. Tropea)—A promising inhibitor of pancreatic lipase. *Phytomedicine Plus*, 2(2), p.100235.
  - 41.Prima, S.R., Julianti, E. and Fidrianny, I., 2023. Update review: Etnopharmacological, bioactivity and phytochemical of *Allium cepa* L. *Pharmacia*, 70(3), pp.717-724.
  - 42.Shri, R. and Bora, K.S., 2008. Neuroprotective effect of methanolic extracts of *Allium cepa* on





- ischemia and reperfusion-induced cerebral injury. *Fitoterapia*, 79(2), pp.86-96.
- 43.Nazir, S., Afroz, S., Tauseef, H., Afsheen, H., Farooqui, R. and Rizvi, A., 2022. Phytochemical Analysis, Safety Profile, Analgesic, and Anti-inflammatory Effect of Ethanol Extract of *Allium fistulosum* L. *Pak-Euro Journal of Medical and Life Sciences*, 5(1), pp.135-146.
- 44.Yoshinari, O., Shiojima, Y. and Igarashi, K., 2012. Anti-obesity effects of onion extract in Zucker diabetic fatty rats. *Nutrients*, 4(10), pp.1518-1526.
- 45.Akash, M.S.H., Rehman, K. and Chen, S., 2014. Spice plant *Allium cepa*: Dietary supplement for treatment of type 2 diabetes mellitus. *Nutrition*, 30(10), pp.1128-1137.