# Comparison of Phytochemical Activity of Onion, Scallion And Leaves of Scallion Soaked In Vinegar

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***Abstract - The antioxidant activities of the ethanolic extracts onion, scallion and leaves of scallion and vinegar were determined by two methods: reducing power and total antioxidant activity. It was found that onion alone and when soaked in vinegar exhibit highest antioxidant activity as compared to scallion and leaves of scallion. Total phenolic content using Folin–Ciocalteu method and total flavonoid content by using aluminium chloride colorimetric assay was also measured. The result showed that leaves of scallion when soaked in vinegar has highest total phenolic content 0.811 ± 0.191 while leaves of scallion alone has highest total flavonoid content 0.201. The present study showed that onion as compared to scallion and leaves of scallion has more antioxidant activity alone as well as when soaked in vinegar while leaves of scallion has highest phenolic and flavonoid content.***

***Keywords: Onion, scallion , leaves of scallion, vinegar.***

## I. INTRODUCTION

The onion (Allium cepa L.) also known as the bulb onion or common onion, is a vegetable and is the most widely cultivated species of the genus Allium. Onions are often grouped according to taste. The two main types of onions are strong flavored (American) and mild or sweet (sometimes called European). The structure and mechanical properties of onions are important factors affecting their textural quality. The onion bulb consists of several layers of pigmented, papery scales surrounding fleshy storage scales that comprise an upper epidermis, an intermediate parenchyma tissue, and a lower epidermis. Chemical analysis of *Allium caepa* L. var *Tropeana* (red onion) seeds showed high amounts of oil (20.4%), fibre (22.4%), crude protein (24.8%), calcium (175.0 mg/100 g), potassium (1010 mg/100 g), low amounts of sodium (11.2 mg/100 g) and six cysteine derivatives.

Scallion, green onion, and spring onion are English names for various Allium species. All of the Allium have hollow green leaves, but these are used while they lack a fully developed root bulb. Used as a vegetable, they are eaten either raw or cooked. Scallions have a milder taste than most onions. While the scallion's fresh bulb is the part that is most often used as a drug, the entire plant is believed to have medicinal properties. Scallion, which belongs to the Liliaceae family, is sometimes called green onion, spring onion, Welsh onion, or Japanese bunching onion. Scallions are very low in calories; 100 gr of fresh leaves provide just 31 calories. Nonetheless, they contain many noteworthy flavonoid anti-oxidants, plant fiber, minerals, and vitamins that have proven health benefits. Being a leafy-greens, scallions naturally carry more plant-derived antioxidants, and dietary fiber than their fellow bulb (allium) members like onions, shallots, etc. 100 gr fresh spring onions provide 2.6 gr or 7% of daily-recommended levels of fiber.

Scallions, like leeks, possess proportionately less thio-sulfinates anti-oxidants than that in the garlics. Thio-sufinates such as *diallyl disulfide, diallyl trisulfide* and *allyl propyl disulfide* convert into allicin through enzymatic reaction when its leaves subjected to crushing, cutting, etc. Laboratory studies show that *allicin* reduces cholesterol production by inhibiting the *HMG-CoA reductase* enzyme in the liver cells. Further, it also found to have anti-bacterial, anti-viral, and anti-fungal activities. They also have some other essential vitamins such as vitamin C, and K. In fact, scallions are one of the richest sources of vitamin K. 100 g of fresh greens provides 207 µg or about 172% of daily-recommended intake of this vitamin. Vitamin K has a potential role in bone health by promoting osteotrophic (bone formation and strengthening) activity. Adequate vitamin-K levels in the diet help limiting neuronal damage in the brain; thus, has established role in the treatment of **Alzheimer's disease.** Spring onions are plentiful in B-complex vitamins as well as some essential minerals such as copper, iron, manganese, and calcium.

## II. LITERATURE REVIEW

Ethanolic and aqueous extracts of *Andrograviss paniculata,* (Vinegar plants) were screened for their phytochemical composition and antibacterial activity against *Shigella dysenteriae, Escherichia coli, Klebsiela pneumoniae,*

*Yersinia enterocilitia, Campylobacter jejuni, Samonella typhi, Proteus vulgaris and Vibrio* species isolated from diarrhoea stool samples. The phytochemical analysis revealed that *A. paniculata* contained alkaloids, tannins, sterols, saponins and cardiac glycosides. The antibacterial potency determined by paper disc diffusion procedure showed that the extracts exhibited appreciable inhibitory activity on the test isolates. The ethanolic extract showed more therapeutic potentials by inducing inhibitory halo of between 2.00 + 0.3 and 16.00 + 0.6 mm in diameter as against 0.00 - 7.00 + 0.5 mm reported for aqueous extract [1]. The alcoholic extract of Hygrophila schulli exhibited strong scavenging effect on 2, 2-diphenyl-2-picryl hydrazyl (DPPH) free radical, superoxide, nitric oxide radical and ABTS radical scavenging assay. The free radical scavenging effect of Hygrophila schulli extract was comparable with that of the reference antioxidants. The data obtained in the present study suggests that the extract of Hygrophila schulli seed have potent antioxidant activity against free radicals, prevent oxidative damage to major biomolecules and afford significant protection against oxidative damage [2]. Antioxidant and antimicrobial activity of the ethyl acetate and water subfractions of methanolic extracts of three Spanish onion varieties were assayed. Flavonoids were mainly present in ethyl acetate subfraction being 34.92 ± 0.75, 7.95 ± 0.16, 0.38 ± 0.01 lmol of rutin eq. g)1 D.W. and its antioxidant capacity was 74.86 ± 1.77, 24.59 ± 0.67, 4.55 ± 0.44 lmol Trolox g)1 D.W. of Grano de Oro, Fuentes de Ebro and Calc¸ ot de Valls varieties, respectively [3]. Low ability of green onion extract to scavenge hydrogen peroxide was noted (35%), whereas high ability was noted in other onion and garlic extracts and ranged from 60 to 90%. The lowest reducing capacity was noted in green onion extract (18%), whereas the highest in garlic extract (196%). Statistically, high significant correlations were observed between total phenolics content and reducing power, scavenging of hydrogen peroxide and chain-breaking activity of extracts [4]. The antioxidant activities of the methanol extracts of selected varieties and parts of garlic and onion were determined by two methods: inhibition of lipid peroxidation induced by tert-butyl hydroperoxide in isolated rat hepatocytes and scavenging activity against diphenylpicrylhydrazyl radical. The total phenolics and the main flavonoids of the hydrolysed onion and garlic samples were also analysed. Onions had clearly higher radical scavenging activities than garlic, red onion being more active than yellow onion. The skin extracts of onion possessed the highest activities [5].

## III. PROPOSED METHODOLOGY

**a) Chemicals Required**

- Methanol
- Ethanol
- Distilled water
- Ferric chloride
- Sulphuric acid
- Glacial acetic acid
- Folin-colcalteu Reagent
- Sodium carbonate
- Aluminium chloride
- Potassium ferricyanide
- Trichloro acetic acid
- Ammonium molybdate
- Ammonia
- Dragendroff reagent

**b) Plant Material**

The Onion, Scallion & Vinegar were collected from local market of Lucknow. These materials were soaked in vinegar for 10 days and then dried in sunlight. Then these dried materials were pulverized separately into a coarse Powder using a mechanical grinder. The resulting powder was then used for extraction.

**c) Preliminary Screening**

The dried powdered material of the Onion, Scallion & Leaves of Scallion were soaked in ethanol fo 10 hrs to get ethanolic extract after filteration through whatman filter paper.

- **Phenolics:** 2 ml of filterate + 2 ml ferric chloride, Blue precipitate indicated presence of phenolics.
- **Saponins (frothing test):** 0.5 ml of filterate + 5 ml distilled water, frothing persistence indicated presence of saponins.
- **Alkaloids:** 2 ml of filterate + 1 % HCl + Dragendroff reagent, orange precipitate indicated the presence of alkaloids.
- **Flavonoids:** 2 ml of filterate + 5ml dilute $NH_3$+ 0.5 ml $H_2SO_4$, yellow colour indicated presence of flavonoids.
- **Terpenoids:** 2 ml of filterate + 1 ml $H_2SO_4$, reddish brown colouration interface indicates the presence of terpenoids.
- **Cardiac glycosides ( Keller-Kinliani test):** 2 ml of filterate+ FeCl3 + 1 ml Glacial acetic acid + 1% $H_2So_4$, brown colour indicates the presence of cardiac glycosides.

**d) Total Phenolic Content Estimation**

The total phenolic content of different extracts was measured using Folin –Ciocalteu method ( Marinovo et al., 2005 ). The reaction mixture consisted 5ml of diluted sample to which 3 ml of distilled water and 0.5 ml Folin – Ciocalteu reagent was added. After 3minutes, add 2ml of 20% $Na_2CO_3$ solution and place the tubes in boiling water

bath for one min, cooled and the absorbance was measured at 760 nm. Standard graph was prepared by using different concentration of pyrocatechol.

**e) Total Flavoniod Content Estimation**

Total flavonoid content was measured by aluminium chloride colorimetric assay ( Marinovo et al., 2005). 1 ml of sample was added to 10ml volumetric flask containing 4ml of distilled water. 0.3 ml of 5% $NaNO_2$ was added to the mixture. After 5 min 0.3 ml of 10% $AlCl_3$ was added. After 5 min, 2 ml of 1 M NaOH was added and the total volume was made up to 10 ml with distilled water. The solution was well mixed and the absorbance was measured against prepared reagent blank at 510 nm. Total flavonoid content of sample was expressed as percentage of catechin equivalents per g dry weight (mgCE/g dw.).

**f) Antioxidant Activity**

**Reducing Power:**

The reducing power of the extracts was determined as described by Lobo et al.,(2010). The reducing power of a compound serves as significant indicator of its potential antioxidant activity. The suspension of prepared extracts in 1ml of water was mixed with phosphate buffer (pH 6.6) and 2.5 ml 1% potassium ferricyanide . The mixture was incubated at 50ºC for 20 min in water bath. Subsiquently 2.5 ml of trichloroacetic acid was added and the mixture was centrifuged at 3000 rpm for 10 min. A 2.5 ml aliquot of the upper layer was mixed with 2.5 ml of distilled water and 0.5ml of 0.1% FeCl3 solution. The absorbance was measured at 700nm. Increased absorbance of the reaction mixture indicates increased reducing power.

**Total Antioxidant capacity:**

According to Lobo et al., (2010), 0.5ml of extract was combined in eppendrof tube with 1 ml of reagent solution (0.6M sulphuric acid, 28mM sodium phosphate and 4mM ammonium molybdate).. The tubes were capped and incubated in thermal block at 95°C for 90 minutes., and the absorbance of the aqueous solution of each was measured at 560 nm against blank.

## IV. STIMULATION/EXPERIMENTAL RESULTS

Table 1: Phytochemical assay results

| S.No | Phytochemicals | Onion | Scallion | Leave of Scallion |
|---|---|---|---|---|
| 1 | Phenols | + | + | + |
| 2 | Cardiac glycoside | + | + | _ |
| 3 | Terpenoid | + | + | _ |
| 4 | Saponin | _ | _ | + |
| 5 | Alkaloid | + | + | _ |
| 6 | Flavanoid | + | + | + |

Table 2: Total phenolic content(TPC) in extracts of onion, scallion and leaves of scallion.

| Sample | Total Phenolic Content |
|---|---|
| Onion | 0.402 ± 0.191 |
| Scallion | 0.432 ± 0.191 |
| Leaves of Scallion | 0.469 ± 0.191 |
| Onion soaked in Vinegar | 0.273 ± 0.191 |
| Scallion soaked in Vinegar | 0.212 ± 0.191 |
| Leaves of Scallion soaked in Vinegar | 0.811 ± 0.191 |

Table 3: Total flavonoids content (TFC) in extracts of onion, scallion and leaves of scallion.

| Sample | Total Flavonoid Content |
|---|---|
| Onion | 0.110 |
| Scallion | 0.115 |
| Leaves of Scallion | 0.201 |
| Onion soaked in Vinegar | 0.012 |
| Scallion soaked in Vinegar | 0.018 |
| Leaves of Scallion soaked in Vinegar | 0.035 |

**Determination of reducing power**

The reducing power assay of antioxidants present in the samples would result in the reducing of $Fe^{3+}$ to $Fe^{2+}$ by donating an electron. The result of antioxidant activity of total phenolics and fllavonoid of onion, scallion, leaves of scallion determined by reducing power which is shown in table-4

**Total antioxidant capacity**

Total Antioxidant capacity of onion, scallion,leaves of scallion is shown in Table-5. According to Lobo et al., 2010 the phosphomolybdenum method is based on the reduction of MO (VI) to MO (V) by the antioxidant comopound and the formation of greenphosphate/ MO (V) complex at acidic pH. The extracts demonstrated electron donating capacity and thus they may act as radical chain terminators, transformating reactive free radical species into stable non reactive products.

Table 4: Reducing power ($Fe^{3+}$ - $Fe^{2+}$ transformation ability)

| Sample | Concentration | | | |
|---|---|---|---|---|
| | 25% | 50% | 75% | 100% |
| Onion | 0.122 ± 0.136 | 0.245 ± 0.136 | 0.367 ± 0.136 | 0.490 ± 0.136 |
| Scallion | 0.098 ± 0.110 | 0.197 ± 0.110 | 0.296 ± 0.110 | 0.395 ± 0.110 |
| Leaves of Scallion | 0.112 ± 0.125 | 0.225 ± 0.125 | 0.337 ± 0.125 | 0.450 ± 0.125 |
| Onion soaked in Vinegar | 0.108 ± 0.121 | 0.217 ± 0.121 | 0.326 ± 0.121 | 0.435 ± 0.121 |
| Scallion soaked inVinegar | 0.094 ± 0.715 | 0.189 ± 0.715 | 0.283 ± 0.715 | 0.378 ± 0.715 |
| Leaves of Scallion soaked in Vinegar | 0.099 ± 0.110 | 0.199 ± 0.110 | 0.298 ± 0.110 | 0.398 ± 0.110 |

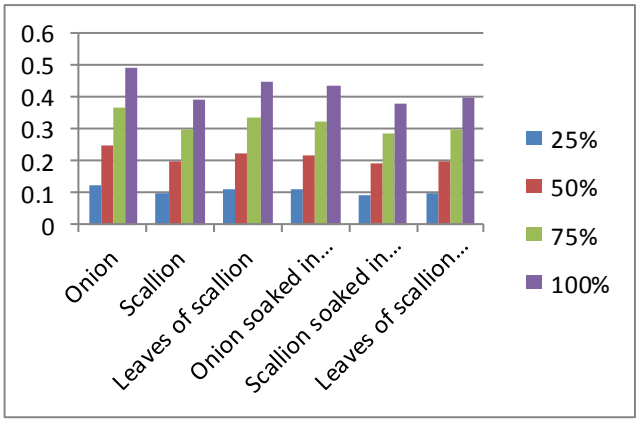


**Figure 1** Antioxidant activity determined by reducing power assay.

Table 5: Total antioxidant capacity of onion,scallion,leaves of scallion.

| Sample | Concentration | | | |
|---|---|---|---|---|
| | 25% | 50% | 75% | 100% |
| Onion | 0.040 ± 0.044 | 0.080 ± 0.044 | 0.120 ± 0.044 | 0.160 ± 0.044 |
| Scallion | 0.029 ± 0.033 | 0.059 ± 0.033 | 0.088 ± 0.033 | 0.119 ± 0.033 |
| Leaves of Scallion | 0.011 ± 0.012 | 0.023 ± 0.012 | 0.034 ± 0.012 | 0.046 ± 0.012 |
| Onion soaked in Vinegar | 0.020 ± 0.018 | 0.040 ± 0.018 | 0.060 ± 0.018 | 0.080 ± 0.018 |
| Scallion soaked in Vinegar | 0.027 ± 0.031 | 0.055 ± 0.031 | 0.082 ± 0.031 | 0.111 ± 0.031 |
| Leaves of Scallion soaked in Vinegar | 0.013 ± 0.014 | 0.026 ± 0.014 | 0.039 ± 0.014 | 0.052 ± 0.014 |

**Figure 2** Antioxidant activity determined by total antioxidant capacity.

## IV. CONCLUSION

The present study showed that Onion, scallion and leaves of scallion is a good source of quercetin, one of the most abundant flavonol-type flavonoids in fruits and vegetables. Onion contains other well-known antioxidant components, in that, volatile sulfur compounds are known to inhibit lipid peroxidation. Onion is useful for the prevention of cardiovascular disease, especially since it diminishes the risk of blood clots. Onion protects against certain infections and stomach cancer. Onion improves lung function, especially in asthmatics.

On the basis of the results obtained in the present study, it is concluded that extract of onion exhibits high phenolic and flavonoid content than extract of onion soaked in

vinegar. It is also concluded that extract of onion exhibits high antioxidant activity than extract of onion soaked in vinegar.

The present study showed that scallions contains many noteworthy flavonoid antioxidants, plant fibre, minerals, and vitamins that have proven health benefits. Being a leafy green scallions naturally carry more plant-derived antioxidants, and dietary fibre than their fellow bulb members like onions, shallots. Etc. They also have some other essential vitamins such as vitamin C, and k.

On the basis of the results obtained in the present study, it is concluded that extract Scallion exhibits high phenolic and flavonoid content than extract of scallion soaked in vinegar. It is also concluded that extract of Scallion exhibits high antioxidant activity than extract of scallion soaked in vinegar. The polyphenols in onions act as antioxidants, protecting the body against free radicals. Eliminating free radicals can help encourage a strong immune system.

The present study also showed that Leaves of Scallion contain important amounts of the flavonoid Kaempferol, which has repeatedly been shown to help protect our blood vessel linings from damage, including damage by overly reactive oxygen molecules. Folate is present in leaves of scallion in one of its bioactive forms (5-methyltetrahydrate) and it is present throughout the plant. Also present in leaves of scallion are impressive concentrations of antioxidant polyphenols. These polyphenols play a direct role in protecting our blood vessels and blood cells from oxidative damage.

On the basis of the results obtained in the present study, it is concluded that extract of Leaves of Scallion exhibits high phenolic and flavonoid content than extract of leaves of scallion soaked in vinegar. It is also concluded that extract of leaves of Scallion exhibits less antioxidant activity than extract of leaves of scallion soaked in vinegar. Leaves of scallion can lower blood sugar levels and also help the body's digestion. By eating leaves of scallion, able to facilitate the growth of body cells.

## V. FUTURE SCOPE

Antioxidants play an important role in inhibiting and scavenging free radicals, thus providing protection to human against infections and degenerative diseases. Current research is now directed towards natural antioxidants originated from plants due to safe therapeutics. Onion and vinegar both are used in day to day consumption. Synthetic antioxidant are recently reported to be dangerous for human health Thus the search for effective, non-toxic natural compounds with antioxidative activity has been intensified in recent years. In addition to endogeneous antioxidant defense system, consumption of dietary and plant-derived antioxidant appears to be a suitable alternative. Dietary and other components of plants form a major source of antioxidants. The traditional Indian diet, spices and medicinal plants rich sources of natural antioxidant; higher intake of food with functional attributes including high level of antioxidant in functional foods is one strategy that is gaining importance. Many promising aspects concerning high daily intake of onions have been elucidated. However, it is apparent that more research is still needed in order to clearly identify *in vivo* health benefits from increased onion consumption in the human diet. It is recommended for further in the future studies that should focus more on other advantages of spices especially the clinical applications in order to obtain low cost treatment and also prevention of recurrent infection.

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