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Therapeutic Potential of Raw Onion Juice: Composition and Clinical Applications

Review Article

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Abstract

The therapeutic value of raw onion (Allium cepa) juice has attracted increasing scientific interest due to its rich phytochemical composition and diverse biological activities. This review explores existing literature on the bioactive compounds found in raw onion juice, including flavonoids (especially quercetin), sulfur-containing compounds (such as allicin and thiosulfinates), and antioxidants. These constituents are linked to several mechanisms that contribute to its medicinal properties, such as anti-inflammatory, antimicrobial, antihypertensive, antidiabetic, and anticancer effects. Experimental studies demonstrate that onion juice modulates key cellular pathways, including oxidative stress reduction, inhibition of pro-inflammatory cytokines, and improvement of insulin sensitivity. Clinical investigations, though limited, suggest potential benefits in managing conditions like hypertension, dyslipidaemia, type 2 diabetes, and Anti-inflammatory and Immune Effects, Anticarcinogenic Effect, NAFLD. Overall, raw onion juice presents promising but underutilized therapeutic potential. Future research should aim to bridge gaps between preclinical evidence and clinical practice, ensuring its safe and evidence-based integration into complementary and integrative health strategies.

Keywords: Raw Onion Juice; Phytochemicals; Quercetin; Antioxidant Activity; Anti-Inflammatory

Introduction

Onion (*Allium cepa*), a staple in culinary traditions worldwide, has long been recognized not only for its flavor but also for its medicinal properties in traditional systems of medicine [1, 2]. Among its various forms, raw onion juice has gained attention for its rich composition of bioactive compounds, including flavonoids, sulfur-containing compounds, vitamins, and antioxidants [3, 4].These constituents are believed to contribute to a wide spectrum of therapeutic effects, ranging from cardiovascular protection and blood sugar regulation to antimicrobial and anti-inflammatory activities. Recent scientific investigations have started to validate many of these traditional claims, exploring the mechanisms by which raw onion juice may exert beneficial effects on human health [5].

Origin

Allium species have been cultivated for over 5,000 years and are now grown in approximately 175 countries worldwide. It is believed that wild onion varieties originated in regions such as Iran, western Pakistan, and Central Asia. The ancient Egyptians regarded the concentric layers of the onion bulb as a representation of cosmic structure and eternity. The word "onion" is derived from the Latin term "*unun*", meaning "one" [6].

Importance

It is widely integrated into various culinary traditions, particularly within the Mediterranean diet, onion is recognized not only as a staple food component but also as a functional ingredient with substantial nutritional and therapeutic potential. Cultivated extensively across the globe, it contributes significantly to both domestic consumption and international trade. Onions are consumed in multiple forms—raw, cooked, or processed—serving as a source of diverse bioactive compounds. These include organosulfur compounds and flavonoids,

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which are associated with a broad range of physiological benefits. Among the most studied are its cardioprotective properties, including hypocholesterolemic, hypolipidemic, antihypertensive, antithrombotic, and hypoglycemic effects. Additionally, onion-derived compounds have demonstrated antiproliferative activity in various cancer cell lines, modulatory effects on bone metabolism, and potential antidepressant-like actions. Moreover, regular intake has been shown to enhance gut microbiota composition, particularly by stimulating the growth of beneficial strains such as *Bifidobacteria* and *Lactobacilli*, thereby supporting overall gastrointestinal and metabolic health [7].

Health Benefits of Onion

1. **Diabetes:** A study indicates that the administration of ripe onion (*Allium cepa*) juice over an extended duration may contribute to the normalization of blood glucose levels. The findings suggest that ripe onion juice exhibits significant antihyperglycemic activity when administered continuously [10]
2. **Cardiovascular:** Daily consumption of onions over a three-month period has been shown to significantly reduce total cholesterol levels, body weight, waist circumference, and body mass index (BMI). Additionally, onion intake was associated with the inhibition of platelet aggregation and an enhancement in fibrinolytic activity. Phytochemicals present in onions, particularly quercetin, demonstrate both preventive and therapeutic potential in the management of prehypertension [11].
3. **Anticarcinogenic Effect:** Recent studies suggest that polyphenolic constituents, particularly flavonoids, may significantly contribute to the antioxidant properties of onions and participate in multiple biological pathways associated with anticarcinogenic effects. Among these, quercetin and its glycosylated derivatives present in onions are likely to exert chemoprotective actions. Additionally, organosulfur compounds such as alkyl sulfides and diallyl disulfides have demonstrated potential in inhibiting the initiation phase of carcinogenesis, primarily by modulating the activity of enzymes involved in the biotransformation of carcinogenic agents [1].
4. **Non-Alcoholic Fatty Liver Disease:** Arising exploration suggests that harmonious input of onion may help alleviate the onset and progression ofnon-alcoholic adipose liver complaint (NAFLD), indeed under metabolic conditions generally associated with increased threat — similar as

Nutrient	Amount	% Daily Value
Calories	45 kcal	–
Total Fat	0 g	0%
Cholesterol	0 mg	0%
Sodium	5 mg	0%
Total Carbohydrate	11 g	4%
• Dietary Fiber	3 g	11%
• Sugars	9 g	–
Protein	1 g	–

Figure 1: Nutritional Profile of Onion [8].

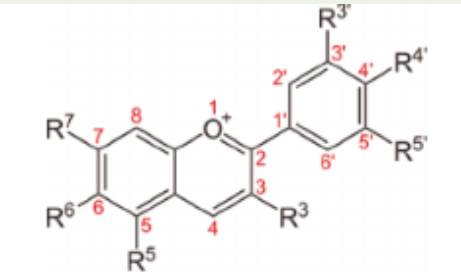

Figure 2: Chemical Structure of Anthocyanin [9].

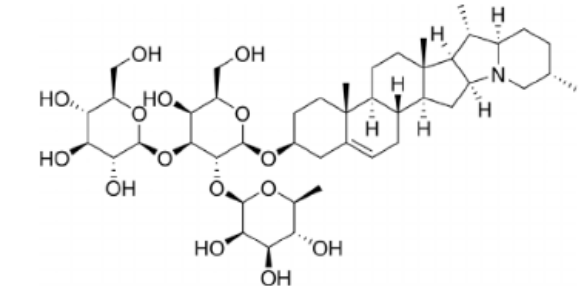

Figure 3: Chemical Structure of Saponin [9].

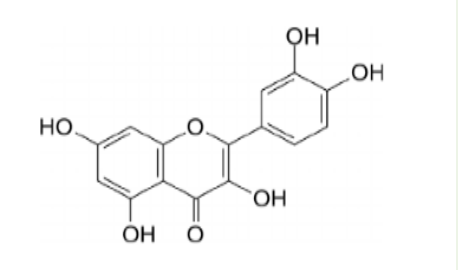

Figure 4: Chemical Structure of Quercetin [9].

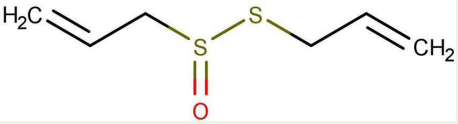

Figure 5: Chemical Structure of Allicin [10].

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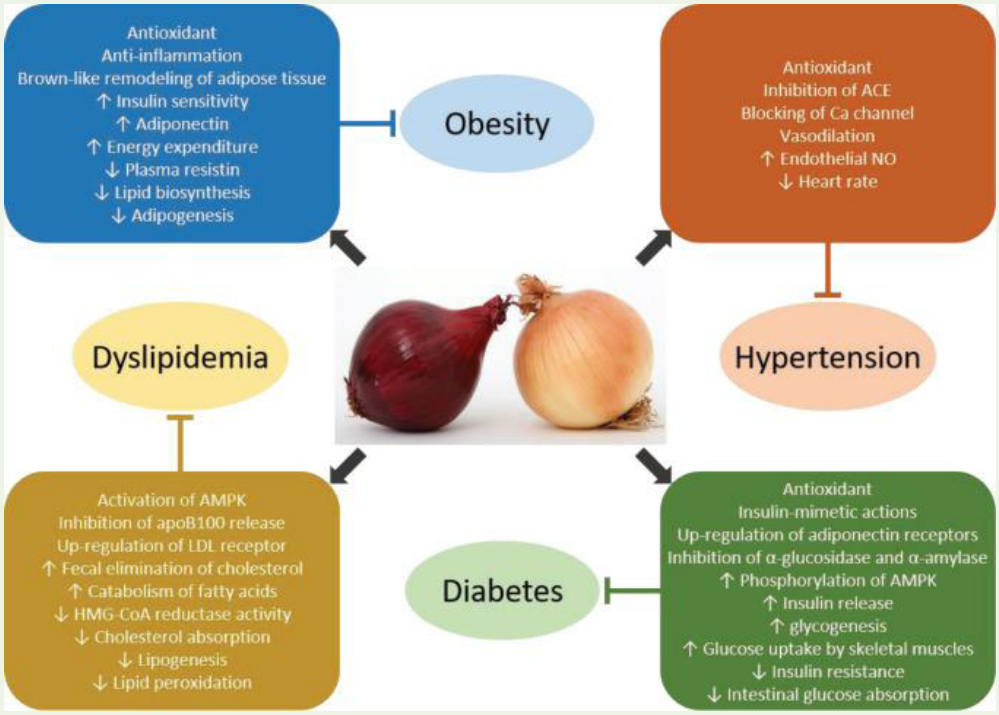

Figure 6: Mechanism of Onion on Metabolic Syndrome [14].

inordinate body weight, elevated blood lipid situations, and consumption of calorie-rich diets high in fats and sugars. These hepatoprotective goods are believed to be intermediated through enhanced regulation of blood glucose and triglyceride situations, as well as repression of hepatic expression of excrescence necrosis factor- nascence (TNF-α), apro-inflammatory cytokine known to play a critical part in dismembering insulin signaling and promoting liver inflammation [12]

5. **Anti-inflammatory and Immune Effects:** Selenium, a trace element found in relatively high concentrations in onions, exhibits notable anti-inflammatory and immunomodulatory properties. It plays a critical role in initiating appropriate immune responses while preventing excessive immune activation. Selenium deficiency in immune cells is associated with increased oxidative stress, impaired cellular proliferation, reduced protein synthesis, and compromised calcium transport. These disruptions can adversely affect immune competence. Furthermore, selenium has been implicated in the regulation of viral infections, inflammatory disorders, and allergic conditions. In addition, quercetin—a flavonoid abundant in onions—has demonstrated anti-inflammatory effects through the inhibition of pro-inflammatory mediators such as leukotrienes, prostaglandins, and histamines. This action contributes to its therapeutic potential in inflammatory conditions such as osteoarthritis (OA) and rheumatoid arthritis (RA), and also supports its role in inhibiting cancer progression [13].

Conclusion

Thus, raw onion juice holds significant and promising, yet largely underutilized, therapeutic potential. Its medicinal properties are attributed to a rich profile of bioactive compounds, including flavonoids like quercetin and various sulfuryl-containing compounds. These constituents have been shown to exert diverse effects, such as anti-inflammatory, antimicrobial, antihypertensive, antidiabetic, and anticancer properties, through mechanisms like reducing oxidative stress, inhibiting pro-inflammatory cytokines, and improving insulin sensitivity. While preclinical and experimental studies provide strong evidence for these benefits, clinical research remains limited Further investigation is warranted to elucidate the mechanisms and clinical utility of these findings, with the ultimate goal of developing safe and evidence-based protocols for clinical implementation.

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References

1. Griffiths G, Trueman L, Crowther T, Thomas B, Smith B (2002) Onions-A global benefit to health. Phytotherapy Research 16: 603-615.
2. Slimestad R, Fossen T, Vågen IM (2007) Onions: A source of unique dietary flavonoids. Journal of Agricultural and Food Chemistry 55: 10067-10080.

Citation: Andhare M, Shirole A, Gambhir S. Therapeutic Potential of Raw Onion Juice: Composition and Clinical Applications. Indian J Nutri. 2025;12(2): 323.

3. Lanzotti V (2006) The analysis of onion and garlic. Journal of Chromatography A, 1112: 3-22.

4. Banerjee K, Mukherjee A, Bandyopadhyay U (2021) Health benefits of onion and garlic: An overview. Journal of Food Biochemistry, 45: e13592.

5. Sangade DA, Shaikh MK, Sangpal RC (2023) A Review: onion (Allium cepa). In Dr. N. J. Paulbudhe College of Pharmacy, International Journal of Pharmaceutical Research and Applications 8: 2305-2317.

6. Saxena R, Kumar R, and ICAR-National Institute of Agricultural Economics and Policy Research. (n.d.). Commodity profile on Onion. In S. Kumar, ICAR-National Institute of Agricultural Economics and Policy Research.

7. Onion Nutrition - National Onion Association (2020) National Onion Association.

8. Pareek S, Narashans S, Sharma S, Kumar V (2017) Onion (Allium cepa L.): Chemistry and Human Health, 2nd Edition Pp: 1145-1162.

9. Victor I, Ogochukwu J, Umezinwa F, Ilukho C, Difa C, Samuel. (2019) The Effect of Structural Modification on the Blood Brain Barrier Permeation Properties of Allicin. Asian Journal of Research in Biochemistry 5: 1-7.

10. Lee CW, Lee HS, Cha YJ, Joo WH, Kang DO, Moon JY (2013) In vivo Investigation of Anti-diabetic Properties of Ripe Onion Juice in Normal and Streptozotocin-induced Diabetic Rats. Preventive nutrition and food science 18: 169-174. https://doi.org/10.3746/pnf.2013.18.3.169

11. Mustafa HE, Elfaki BA, Abbakr IA, Ramaiah P, Nomani I, et al. (2025) EFFECT OF THE ONIONS ON CARDIOVASCULAR RISK FACTORS. South Eastern European Journal of Public Health 2025: 1176-1184.

12. Hadi E, Forough F, Hassan EZ, Azita H (2017) The Effects of Onion Consumption on Prevention of Nonalcoholic Fatty Liver Disease. Indian Journal of Clinical Biochemistry 33: 75-80.

13. Johnsy R (2016) Onion -A Miraculous Vegetable 2016: 2456-1592.

14. Galavi A, Hosseinzadeh H, Razavi BM (2021) The effects of Allium cepa L. (onion) and its active constituents on metabolic syndrome: A review. Iranian journal of basic medical sciences 24: 3-16.

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