

Edible plants: promising candidates for preventive and curative care in ophthalmological disorders

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Abstract

The objective of this study is to highlight the importance of edible plants commonly used in Indian households, but also medicinally acclaimed for various eye problems. Plants are a rich source of phytochemicals that, through various mechanisms fight against infections and diseases, thereby providing health benefits. The various search terms such as cataract, ophthalmology, glaucoma, etc., were used to select the plants used for eye problems in various traditional medicinal systems. However, a strong recommendation is also made to conduct in-depth research in this aspect to elucidate the possible mechanisms responsible for these preventive actions.

Keywords: Edible and medicinal plants, Ophthalmic disorders, Phytoconstituents

Introduction

Since ancient times, plants have been used for edible and medicinal purposes in almost all civilizations of the world [1]. Globally, there have been approximately 400 plant species cultivated and listed as vegetable crops [2]. In a recent study, the use of 156 plant species used in Indian households as vegetables was found to possess medical attributes commonly used for toothache to HIV. Some of them were also reported for eye problems, including swollen eyes and other eye infections. The data analysis revealed that these species belonged to 59 families comprising 151 genera [3]. Eye disorders encompass numerous conditions which directly or indirectly affect the eye structure, resulting in impairment of vision at any stage of life. These can be broadly categorized as refractive disorders (myopia, hyperopia, astigmatism, presbyopia), and other age-related conditions, such as cataract, glaucoma macular degeneration. A few other conditions like dry eyes, conjunctivitis, retinal detachment, diabetic retinopathy, amblyopia, strabismus can also take place. In almost all cases of eye disorders, the general symptoms include pain in the eyes, or discomfort, redness, itching, swelling in the eyes, blurry/double or distorted vision, flashes or floaters of light, etc. Amblyopia is the most common cause of vision impairment in children [4]. In numerous studies, it has been proven that most of the eye disorders mainly result due to oxidative stress, and it's the plasma antioxidant capacity playing an important role in preventing diseases like cataract, glaucoma and age-related macular degeneration (ARMD). Except for chronic conditions such as retinal detachment, glaucoma etc., these problems can be reduced/prevented to some extent by maintaining a healthy lifestyle, by eating fruits and vegetables regularly in the diet. These are mostly rich in antioxidants and thus impart preventive action against eye problems [5,6]. All across the globe, many studies are being done to elucidate the mechanism behind these preventive actions of various phytochemicals present in plant species.

Edible Plants used for Eye Problems

The plants like *Alternanthera sessilis* (L.) DC., *Carum carvi* L., *Luffa acutangula* (L.) Roxb., *Phaseolus coccineus* L., *Salix caprea* L., *Solanum nigrum* L., *Symplocos racemosa* Roxb., *Allium cepa* L., are commonly used as vegetables in India, however in recent research they have been found to be effective in various eye problems [3]. In India the tribal people of Assam mix the ground fresh leaves of *Alternanthera sessilis* with black pepper, garlic and raw milk and consume this orally as a remedy for weak eyesight, eye diseases, including night blindness. The leaves are fried in ghee (clarified butter) and applied on the eyelid for curing cataract, smoky vision, and acute conjunctivitis [7,8]. The leafy part is used in salad or cooked as a green vegetable, or in soups and curry. Leaves are a rich source of vitamins A, B, C and K, minerals as iron, calcium, magnesium, manganese, and potassium. The leaves of *Carum carvi* are consumed as a vegetable; besides this, it is considered to be hot and dry in potency and is used as a kohl eye drop in eye problems [9]. The leaves are used in the form of green leafy vegetables, salads, and soups. Its seeds are also used as a spice in Indian cooking. The dilute infusion of berries of *Solanum nigrum* is used for the treatment of blindness, cataract, conjunctivitis, glaucoma and trachoma in Algeria [10] and berry juice helps to calm sore eyes [11]. However, in India, the berries are eaten as a cooked vegetable. *Peperomia pellucida* (L.) Kunth is used as a vegetable in cooked form and also used in African, Asian, and South American folk medicine to manage cataract and conjunctivitis [12]. *Vaccinium myrtillus* L. (Bilberry) possess anthocyanidins, which are potent antioxidants and have been traditionally used for improving vision in low light conditions. Its berries are edible and used for the preparation of pies, tarts, jams, muffins, etc. For the treatment of granular conjunctivitis, fresh juice of *Luffa acutangula* fruit is put in the eyes. The juice contains a good amount of β -carotene and is considered good for the eyes [13]. A root decoction from *Phaseolus coccineus* is applied to swollen eyes for relief of pain and inflammation [14]. The leaves of *Salix caprea* are used as an eye tonic [15]. A few other species such as *Matricaria chamomilla* L., *Emblia officinalis*, *Terminalia bellerica*, *Terminalia liachebula*, *Foeniculum vulgare* are also used for edible purposes in the form of drink, tea, soup, and salads and have been scientifically proven to be useful in eye problems [16]. Plants used as spices and condiments are also medicinally used for various eye problems such as otorhinolaryngologic and other problems. The commonly used plants are black pepper (*Piper nigrum* L.), holy basil (*Ocimum sanctum* L.) and adrak (*Zingiber officinale*) [17]. The fruits of *Emblia officinalis* (Amla) are widely used to prepare drinks, sauce, pickle, and chutney and also widely used for Rasayana (rejuvenating) properties, promoting overall health and vitality [18]. The use of many plants like *Curcuma longa*, mint, holy basil, cardamom, kesar, rose, sandal wood, with many have been widely used in the traditional Indian system of medicine, Ayurveda. The mode of preparation from these plants varies depending on many factors known to the practitioner. These plants are also used for edible purposes in many culinary preparations. Ayurvedic eye formulation like 'Sauyma' and 'Drishti' manufactured in India uses plants as described in the classical Ayurvedic text "*Bhavya Prakash Nighantu*" in a certain composition and has proven useful in eye problems. Besides plant species, minerals and salts such as Gulab Camphor, Sandhav Lavan, Yashad Bhasm, Shudh Suhaga, and Sphatic Bhasm are also used. The plant species like Shwet pyaz, Adrak swaras, Nimbu swaras, Shahad (honey), Aprajita, Nirgundi, Tulsi Patra, Haritaki, Nimba, Mamira, Bahera, Bhringraj, Rakt

Chandan, Mulethi, Nirmali, Lodhra, Haridra, Amla, Sahijana, Durba, Palash, Rasaut, Punarnava, Aloe vera, Dhaniya, Ajmoda, Manjishtha, have been used for the preparation of these eye drops [19]. Besides, some of the plants are only used to cure eye disorders and are not edible. *Swertia chirata* Buch.-Ham., whole plant helps to improve eyesight; root juice of *Commelina bengalensis* Linn., is applied in eye sores. Leaf and pseudo bulb of *Dendrobium nobile* Lindl., is used in redness of eyes. This plant is also used as rasayana in Ayurveda [20]. Others include *Andrographis paniculata* (Burm. f.) Wall. ex Nees, *Justicia adhatoda* L., *Calendula* species etc. The use of *Peganum harmal*, *Aloe vera*, *Lycium afrum*, *Ruta graveolens* has been used for eye problems, including weak vision in the Iranian traditional medicinal system [9]. Thus, it clearly reflects that globally, the ancient knowledge about diseases and their natural cure is almost the same; the need is to reconsider and elucidate the possible mechanism behind it scientifically.

The ongoing scientific research on plants used for eye problems confirms their promising role in the management of eye-related disorders. In scientific studies, the intraperitoneal injection of the aqueous extract of Amla (*Emblia officinalis*), Bahera (*Terminalia bellerica*) and harad (*Terminalia liachebula*), commonly known as *Triphala*, at doses of 25 mg/kg body weight, was found to prevent selenite-induced cataract formation. It was found to enhance the activity of antioxidant enzymes and decreased the extent of lipid peroxide in contradiction of selenite-induced oxidative stress [21]. Similarly, the aqueous extract of seeds of Saunf (*Foeniculum vulgare*) was found to have protective and therapeutic properties against sodium selenite-induced cataract in the rabbit's eye [22] and was also found to reduce intraocular pressure, and this maximum reduction in pressure in the eyes and was comparable with that of timolol. This mechanism of action was mediated through an anticholinesterase effect [23]. Another important green vegetable is onion, used in almost every cuisine except for sweet preparations. The administration of 1 drop of onion (*Allium cepa*) extract in the eyes of mice every 8 hours for 14 days helped to prevent the formation of selenite-induced cataract [24]. The silver nanoparticles from the leaf extract of *Alternanthera sessilis* were prepared and identified with synchronous action, assuring the prevention as well as eradication of ocular pathogens, bereft of any side effects. The synergetic activity of these silver nanoparticles against ocular pathogens was also noticed [25]. A compound phytostigmine isolated from *Physo stigma venenosum* Balf., was found to lower the intraocular pressure, thereby controlling the progression of glaucoma [26]. A few of the species mentioned in this research are also medicinally used in other traditional medicinal system as TCM (China), Korean medicine (Korea) Kampo (Japan) etc. [3].

Phytochemicals from Plants for the Prevention and Cure of Eye Disorders

The plants contain an attractive pool of chemical compounds, such as polyphenols, terpenes, sterols, etc. The scientific investigation confirms the role of these phytochemicals responsible for a wide range of therapeutic and medicinal attributes. The green leafy vegetables, such as lettuce, spinach, parsley, kale, and other vegetables, such as green peas, pumpkin, and sweet corn, are rich sources of lutein and zeaxanthin. These compounds function as sunblock for the eyes and protect the eyes from harmful blue light [27]. Retina has a high concentration of fatty acids, and vitamin E protects fatty acids from harmful oxidation, thereby preventing them from any damage [28].

The best dietary sources of vitamin E include almonds, sunflower seeds, vegetable oils like flaxseed oil, and beta carotenoid is found in kale, spinach, carrot in large amounts. The specific wavelength of light is filtered through carotenoids, protecting the photoreceptors from light damage and also providing visual performance in the eyes [29]. It also helps eyes from age-related eye disease. Vitamin A helps to maintain photoreceptors in the eyes and helps to prevent night blindness, dry eyes and other eye problems [30]. High amounts of vitamin C are found in many fruits, such as bell peppers, citrus fruits, guavas, kale, and broccoli. Dietary sources of zinc include peanuts and pumpkin seeds, which are widely consumed in Indian meals. Both zinc and vitamin C play an important role in eye health. Polyphenols are abundantly present in plants, and approximately 800 types of compounds are categorized in this broad range. Resveratrol, a natural phytoalexin polyphenol, is commonly found in berry skins, peanuts and grapes. This compound is found to be effective against injured cornea, keratoconus and dry eyes. Another common polyphenol, epigallocatechin-3-gallate, found in green tea, was found to inhibit ROS (reactive oxygen species) in human corneal limbal epithelium. The corneal surface irregularities were found to improve significantly after quercetin treatment, and it also helped to significantly decrease detachment of corneal cells and increase the number of conjunctival goblet cells. The green leafy vegetables such as chives, spinach, dill, kale, tarragon and a few other like artichoke, maize, etc., are rich in polyphenols, such as kaempferol and ferulic acids. These polyphenolic compounds significantly restored tear fluid and showed improvement in fluorescein staining and also in recovery of corneal thickness. In various studies, it has been proven that various micronutrients and nutraceutical products containing various plant species can be effective against various eye problems and diseases [31,32]. In a study, the caloric restriction has been found to be effective in recovering from age-related eye problems along with other functional decline in organs [33].

Future Prospectives

Plants are a rich source of natural phytochemicals and have been used for medicinal and edible purposes since ancient times. The use of plant species in a natural way for the prevention and cure of eye problems is of great significance. The research conducted on phytochemistry, pharmacodynamic and kinetic principles, including antioxidant, antimicrobial, anti-inflammatory and immunomodulatory actions, and other very specific pharmacological activities provides an insight into the health promoting activities of these edible plants. The clinical trials are also suggestive. This study will help to understand the role of edible plants in the prevention and cure of few ophthalmic disorders as were only used in traditional medicinal systems. The research based on understanding the role played by various phytochemicals in these plant species and the elucidation of mechanism behind it is the need of hour so that the scientific validation of these plants can be done.

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References

1. Lim TK. Edible medicinal and non-medicinal plants. Dordrecht, The Netherlands: Springer; 2012.
2. Elia A, Santamaria P. Biodiversity in vegetable crops, a heritage to

save: The case of Puglia region. Italian Journal of Agronomy. 2013 Jan 1;8(1):e4.

3. Balkrishna A, Shankar R, Joshi RA, Srivastava A, Prajapati UB, Saini N. Common Indian vegetables medicinally acclaimed for retaining health and vigor: a review. Discov Food. 2025 Jul 1;5(1):209.
4. Cassel GH. The eye book: a complete guide to eye disorders and health. JHU Press; 2021 Apr 27.
5. Braakhuis A, Raman R, Vaghefi E. The Association between Dietary Intake of Antioxidants and Ocular Disease. Diseases. 2017 Jan 30;5(1):3.
6. Everitt AV, Hilmer SN, Brand-Miller JC, Jamieson HA, Truswell AS, Sharma AP, et al. Dietary approaches that delay age-related diseases. Clin Interv Aging. 2006;1(1):11–31.
7. Borah S, Borah N. Consumption of Wild Perennial Medicinal Herbs by Indigenous People of Assam. Int. J. Curr. Microbiol. App. Sci. 2021;10(01):1952–9.
8. De LC. Medicinal and aromatic plants of North-East India. Int J Dev Res. 2016 Sep 17;6(11):10104–14.
9. Shayanfar J, Ghasemi H, Esmaili SS, Alijaniha F, Davati A. Useful Medicinal Plants for Vision Impairment in Traditional Iranian Medicine. Galen Med J. 2019 Sep 18;8:e1285.
10. Jain R, Sharma A, Gupta S, Sarethy IP, Gabrani R. Solanum nigrum: current perspectives on therapeutic properties. Altern Med Rev. 2011 Mar;16(1):78–85.
11. Yang RY, Ojiewo C. African nightshades and African eggplants: Taxonomy, crop management, utilization, and phytonutrients. African natural plant products volume II: Discoveries and challenges in chemistry, health, and nutrition. 2013:137–65.
12. Ho KL, Yong PH, Wang CW, Kuppusamy UR, Ngo CT, Massawe F, et al. Peperomia pellucida (L.) Kunth and eye diseases: A review on phytochemistry, pharmacology and toxicology. J Integr Med. 2022 Jul;20(4):292–304.
13. Manikandaselvi S, Vadivel V, Brindha P. Review on Luffa acutangula L.: Ethnobotany, phytochemistry, nutritional value and pharmacological properties. Int J Curr Pharm Rev Res. 2016;7(3):151–5.
14. Etoamaihe JU, Egbu CU, Agriga AN. Determination of Some Physical Properties of Immature Runner Bean (*Phaseolus coccineus*) Pods. Arid Zone Journal of Engineering, Technology and Environment. 2018 Dec 3;14(4):686–92.
15. Castagna F, Piras C, Palma E, Musolino V, Lupia C, Bosco A, et al. Green veterinary pharmacology applied to parasite control: Evaluation of *Punica granatum*, *Artemisia campestris*, *Salix caprea* aqueous macerates against gastrointestinal nematodes of sheep. Vet Sci. 2021 Oct 15;8(10):237.
16. Nafees S, Akhtar J, Kaur J. Indian traditional medicinal plants in ophthalmic diseases. Avicenna J Phytomed. 2022 Nov-Dec;12(6):566–75.
17. Dey A, Nandy S, Mukherjee A, Modak BK. Sustainable utilization of medicinal plants and conservation strategies practiced by the aboriginals of Purulia district, India: a case study on therapeutics used against some tropical otorhinolaryngologic and ophthalmic disorders. Environ Dev Sustain. 2021 Apr;23(4):5576–613.
18. NV R, Mishra A. Traditional methods of food habits and dietary preparations in Ayurveda—the Indian system of medicine. Journal of Ethnic foods. 2019 Dec;6(1):1–9.
19. Pooja Lal VK, Verma A. A review on Ayurvedic medicinal plants for

- eye disorders from ancient to modern era. Int J Pharm Sci Res. 2014; 5:5088–96.
20. De LC. Medicinal and aromatic plants of North-East India. Int J Dev Res. 2016 Sep 17;6(11):10104–14.
21. Biswas NR, Gupta SK, Das GK, Kumar N, Mongre PK, Haldar D, et al. Evaluation of Ophthacare eye drops--a herbal formulation in the management of various ophthalmic disorders. Phytother Res. 2001 Nov;15(7):618–20.
22. Hassan OA, Abu-Raghif AR, Rasheed AM, Al-Yawer MA. Effect of *Foeniculum vulgare* seed aqueous extract eye drops on selenite induced cataract in rabbits. Int J Pharm Sci Rev Res. 2017 Nov;47(16):83–7.
23. Agarwal R, Gupta SK, Agrawal SS, Srivastava S, Saxena R. Oculohypotensive effects of *foeniculum vulgare* in experimental models of glaucoma. Indian J Physiol Pharmacol. 2008 Jan-Mar;52(1):77–83.
24. Javadzadeh A, Ghorbanihaghjo A, Bonyadi S, Rashidi MR, Mesgari M, Rashtchizadeh N, et al. Preventive effect of onion juice on selenite-induced experimental cataract. Indian J Ophthalmol. 2009 May-Jun;57(3):185–9.
25. Sarvamangala D, Kantipriya K, Murthy US. Green synthesis of AgNP'S using *Alternanthera Sessilis* leaf extract [a natural source for ocular therapy]. Int J Innov Res Sci Eng Technol. 2014;3:15000–10.
26. Pinheiro GKLO, Araújo Filho I, Araújo Neto I, Rêgo ACM, Azevedo EP, Pinheiro FI, et al. Nature as a source of drugs for ophthalmology. Arq Bras Oftalmol. 2018 Sep-Oct;81(5):443–54.
27. Eisenhauer B, Natoli S, Liew G, Flood VM. Lutein and Zeaxanthin-Food Sources, Bioavailability and Dietary Variety in Age-Related Macular Degeneration Protection. Nutrients. 2017 Feb 9;9(2):120.
28. Wang J, Li M, Geng Z, Khattak S, Ji X, Wu D, et al. Role of Oxidative Stress in Retinal Disease and the Early Intervention Strategies: A Review. Oxid Med Cell Longev. 2022 Oct 14;2022:7836828.
29. Sangija F, Martin H, Matemu A. African nightshades (*Solanum nigrum* complex): The potential contribution to human nutrition and livelihoods in sub-Saharan Africa. Compr Rev Food Sci Food Saf. 2021 Jul;20(4):3284–318.
30. Sajovic J, Meglič A, Glavač D, Markelj Š, Hawlina M, Fakin A. The Role of Vitamin A in Retinal Diseases. Int J Mol Sci. 2022 Jan 18;23(3):1014.
31. Favero G, Moretti E, Krajčíková K, Tomečková V, Rezzani R. Evidence of Polyphenols Efficacy against Dry Eye Disease. Antioxidants (Basel). 2021 Jan 28;10(2):190.
32. Pellegrini M, Senni C, Bernabei F, Cicero AFG, Vagge A, Maestri A, et al. The Role of Nutrition and Nutritional Supplements in Ocular Surface Diseases. Nutrients. 2020 Mar 30;12(4):952.
33. Kawashima M, Ozawa Y, Shinmura K, Inaba T, Nakamura S, Kawakita T, et al. Calorie restriction (CR) and CR mimetics for the prevention and treatment of age-related eye disorders. Exp Gerontol. 2013 Oct;48(10):1096–100.