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# HERBAL DRUGS USED IN TREATMENT OF CATARACT

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## ABSTRACT

Cataract surgery is the commonest single surgical procedure carried out in the developed world. In the developing world, cataract remains the commonest cause of blindness. In 1990 an estimated 37 million people were blind worldwide—40% of them because of cataract.1 Every year, an extra 1-2 million people go blind. Every five seconds one person in our world goes blind, and a child goes blind every minute. In 75% of these cases the blindness is treatable or preventable. However, 90% of blind people live in the poorest sections of the developing world, and without proper interventions the number of blind people will increase to 75 million by 2020. Various aspects of the surgery for age related cataract have changed substantially in the past five years, and the quality of outcome, plus the improved safety of the modern procedure, has in part driven the increase in numbers of procedures performed.

**KEYWORDS:** Cataract, Ginger, Oxidative stress, Flavonoids.

## INTRODUCTION

Cataract is the leading reason of blindness worldwide and is defined by the presence of any lens opacities or loss of transparency. The most common symptoms of cataract are impaired vision, decreased contrast sensitivity, color disturbance, and glare. Oxidative stress is among the main mechanisms involved in the development of age-related cataract. Surgery through phacoemulsification and intraocular lens implantation is the most effective method for cataract treatment, however, there are chances of serious complications and irreversible loss of vision associated with the surgery.

The crystalline lens lies behind the iris and represents the dynamic part of the eye's optical system, responsible for focusing the image onto the retina. Cataract is defined by the presence of any lens opacities or loss of transparency.

**Cataract pathogenesis**

Various mechanisms have been associated with age-related cataract pathogenesis. Lens opacities may appear due to changes in the microarchitecture, caused by mutations, biomechanical, or physical changes.

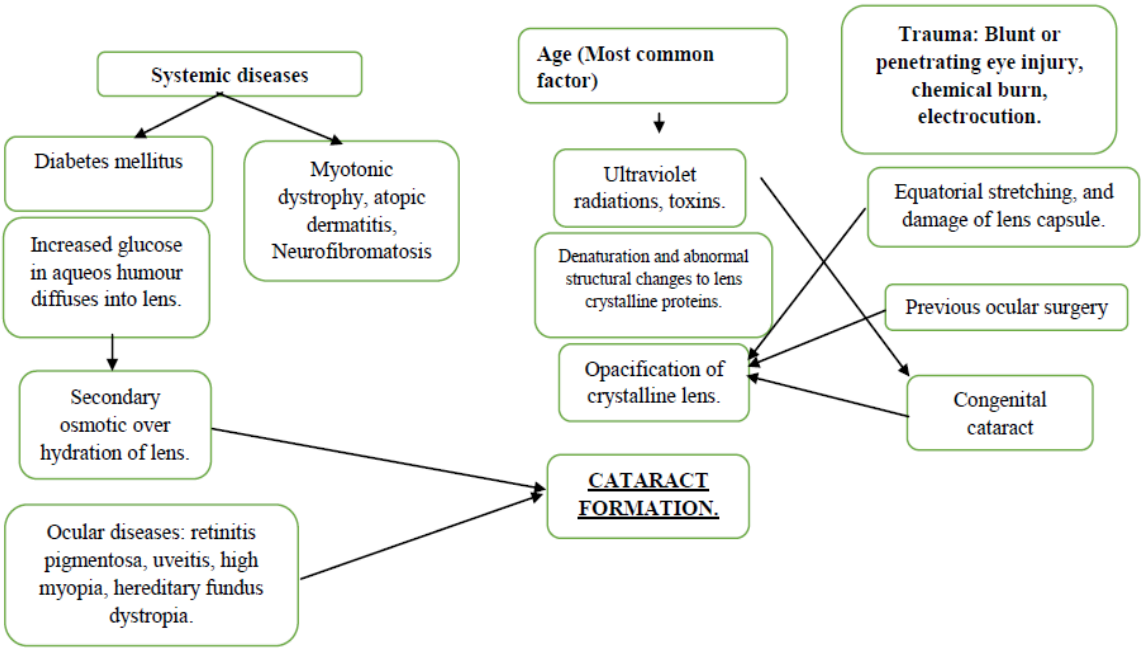
**Mutation:-** Despite cataract being a multifactorial disease, sometimes mutations alone can cause lens opacities and this usually leads to congenital or pediatric cataract. Studies have presented more and more evidence that genetic factors are also part of age related cataract pathogenesis, raising the probability of molecular genetic relations between lens development and aging.

**Oxidative stress:-** Oxidative stress is among the main mechanisms involved in the development of age-related cataract. Oxidative stress occurs when reactive compounds like the superoxide anion, hydroxyl radicals, and hydrogen peroxide are not neutralized by antioxidant enzymes and defense systems. Enzymes like catalase, SOD, and GPX are crucial for the homeostasis of the antioxidant system and ROS.

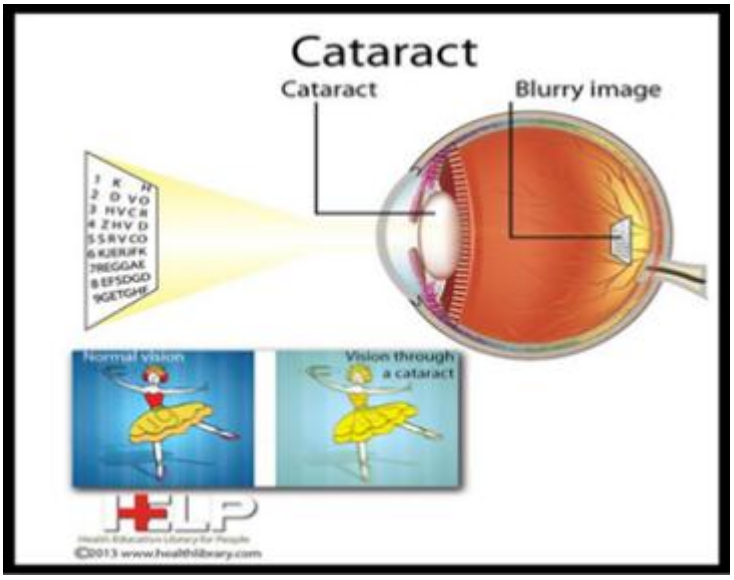
**Crystalline problems:-** Crystallins, the major structural lens proteins have an imperative role in the lens transparency and acquire post-translational alterations during cataract formation, which lead to protein insolubility, aggregation and loss of lens transparency. Out of the three major crystallins, α-, β-, and γ-, α crystallins exhibit chaperone like activity, preventing them to aggregate. The chaperone activity is reduced in cataractous lenses. Prolonge hyperglycemic conditions increase the chances of crystallins deterioration.

**Protein structures:-** Alterations in the protein structure are also determined by UV exposure. Studies have shown that UVB generates moredamage than UVA and that damages are prevented by the lens filters. After UV radiations, proteins suffer chemical reactions resulting in aggregations, decreasing the transparency of the lens. The crystalline lens is particularly exposed to phototoxic damage, because it absorbs most of UV radiation, together with cornea.

**Cataract: Pathogenesis**




**Medicinal Plants/Natural products used against cataract on Selenite/Sodium selenite induced cataract Models and Suggested/Possible mechanisms of action.**




- Alangium salviifolium (L.f.) Wangerin (Syn. Alangium lamarckii Thwaites) (Leaves)

Alcoholic extract at an increasing concentration between 0 and 300 µg/mL (IC50 106 ± 5.11 µg/mL)

Exhibit significant inhibitory effects on aldose reductase (AR) in the rat lens in vitro.

- Allium cepa L. (Tuber/bulb)

50% diluted juice

Prevention of selenite-induced cataract formation by increase in superoxide dismutase (SOD) and total antioxidant level and activities of glutathione peroxidase (GPX) in lens through instillation of juice in rat eyes.

- Allium sativum L. (Tuber/bulb)

Aqueous extract, 1 mL/kg body weight

Free radical scavenging activity (FRSA), antioxidant properties and associated with increased TA level, SOD and GPX activities in the lens.

- *Brassica oleracea* L. var. *italica* Plenck (Edible part)

Flavonoid fraction

Maintains antioxidant status, ionic balance via Ca2+ ATPase pump, inhibits calpain activation, lipid peroxidation, and protein insolubilization.

- *Cochlospermum religiosum* (L.) *Alston* (Leaves)

Isolated isorhamnetin-3-glucoside, 50 µg/mL

Retardation of selenite cataract in vitro via preventing oxidative stress, calcium accumulation and preclusion of lipid peroxidation.

- Coffea arabica L.

1 mL of Instant black coffee

Decreased level of total nitric oxide, tumor necrosis factor-α (TNF- α), Ca-ATPase, superoxide dismutase, interleukin (IL)-1β, preserved enzyme antioxidants and lens proteins.

- Dregea volubilis (L.f.) Benth. ex Hook.f. (Leaves)

Isolated drevogenin D, 50 µg/mL

Antioxidant activity (affecting glutathione peroxidase, superoxide dismutase, catalase, and glutathione reductase), raises reduced glutathione and protein sulfhydryl levels, and decreases the lipid peroxidation levels.

- Tephrosia purpurea (L.) Pers. (Whole plant)

Flavonoid rich fraction (40 mg/kg) or alcohol extract (300 mg/kg)

Maintenance of the antioxidant status and prevention of protein oxidation and lipid peroxidation in lens.

- Triphala [An Ayurvedic formulation consisting of Emblica officinalis Gaertn., Terminalia chebula Retz., and Terminalia bellirica (Gaertn.) Roxb.]

Aqueous extract at 25, 50, and 75 mg/kg body weight i.p.

Restoration of GSH and reduced malondialdehyde levels. Substantial restoration in antioxidant enzymes activities like glutathione peroxidase, superoxide dismutase, catalase, and glutathione-s-transferase.

**Medicinal Plants/Natural products used against cataract on preventing Photo-oxidative damage**

- Citrus aurantium L. (Peel)

Methanol-water extract, 100 and 200 mg/kg body weight

Delay in onset and maturation of naphthalene induced cataract vis prevention of the photo-oxidative damage produced by naphthalene.

- Ginkgo biloba L. (Leaves)

Standardized EGb761 extract (24% flavonol glycoside and 6% terpene lactones)

Protection from radiation induced cataracts in rat lens via antioxidant property.

Medicinal Plants/Natural products used against cataract on Sugar-induced lens Opacity/Streptozotocin induced diabetic Cataract/Galactose, glucose and xylose Induced/Zucker diabetic fatty (ZDF) aldose reductase rat models and possible mechanisms of action.

- Angelica dahurica (Hoffm.) Benth. & Hook.f. ex Franch & Sav. (Roots)

Ether extract (100 µg/mL) (Byakangelicin)

Suppression of galactose induced cataract formation in diabetic rats via AR inhibiting property.

- Silybin

Silybin, 231 mg/day for 4 weeks

Reductions in the erythrocytic sorbitol level which lead to formation of glycation end products.

- Vitamin K

Vitamin K

Lens Ca2+ homeostasis modulation and inhibition of osmotic and oxidative stress.

- Zingiber officinale Roscoe (Rhizomes)

Powder

Reduction in the carbonyl stress, inhibition of osmotic stress by reduction in the activity of the polyol pathway, oxidative stress prevention.

**Medicinal plants/natural products used against cataract on advanced glycation end products (AGE)- BSA cross-linking inhibition assay and lens aldose reductase activity models and possible mechanisms of action**

- Cinnamomum verum J.Presl (Bark)

Ethanolic extract fractions containing Procyanidin-B2, 1–3 mg

AGE inhibition of eye lens proteins under in vitro conditions and inhibition of the formation of glycosylated hemoglobin in human blood in ex vivo conditions.

- Flavonoids

Chrysin, apigenin, and baicalein

Inhibition of glycation, glycation induced lens opacity, AGEs, AR and lens protein aggregation.

**Medicinal plants reported globally by different Ethnopharmacology/Ethnobotanical surveys to be used in the treatment of cataract**

- Aloe vera (L.) Burm. f. (Asphodelaceae)

One drop of leaf juice twice a day is used as eye drop

Anthraquinones; aloe emodin and chrysophanol

- Typha angustifolia L. (Typhaceae)

New stems are applied on the eye

Pentacosanoic acid; β-sitosterol; nonadecanol; naringenin; daucosterol; uracil typhaneoside; nicotinic acid; vanillic acid; succinic acid; thymine; stearic acid propanetriol ester.

**Conflict of interest statement**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**The most common risk factors that contribute to cataracts**

I. Smoking
II. Diabetes
III. Long-term use of corticosteroid medications
IV. Ultraviolet light exposure
V. Dietary deficiencies
VI. Obesity
VII. High blood pressure

VIII. Excessive alcohol drinking

IX. Rosemary And Lemon

Rosemary as a herb helps in cataract problems. Make a mixture of rosemary, catmint and lemon balm. Bring the mixture to a boil by adding water. Now allow this mixture to cool down and consume it in the form of a tea. Consuming this tea on a regular basis helps in curing cataracts.

You can also use rose water in the eyes. For relaxing the eyes, take one teaspoon of rose water, mix it with one teaspoon of lemon juice. Add 8 to 10 drops in the affected eye. During the early stages of cataract, this remedy helps in preventing the disease from spreading. This relaxes the eyes too for clear visibility.

**Garlic cloves**

Chewing two to three garlic cloves every day can instantly change the problems of cataracts and blurred vision. Garlic is a natural cure for many diseases and cataract is one of them. It also helps in reducing cholesterol and heart related diseases. You can chop garlic into small pieces and have it three times a day. You can also include it in herbal tea and have this 2 or 3 times a day.

**Ginkgo biloba**

This is another herbal remedy for cataracts. This herb helps in increasing blood flow to the region of the eyes, and thus helps to effectively cure problems of cataract. It is recommended to consume 40 to 80 grams of the herb on a daily basis for atleast 3 times. The herb can be made into a paste and consumed.

**Ginger and Onion**

Mix ginger juice, white onion juice and lemon juice in equal quantity. Add honey to the extent of 5 times this quantity. Mix all the contents and keep it in a clean bottle. You can use two drops of this liquid in the eye every day. However, if you have had any kind of surgery in the eye, you must not use this remedy.

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