



A Review on Anti-Cataract Activity of *Cucurbita Pepo*

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ABSTRACT

A cataract is a condition which causes clouding of the normal clear lens of the eye. Cataract can develop naturally with age or sometimes due to other risk factors like hypertension and diabetic conditions. Eye lenses become opaque or cloudy due to the deposition of fats and proteins eventually. At early stage it may not disturb with the vision but as cataract grows larger, it clouds more of the lens and distorts the light passing through lens and lead to cause of blindness.

Pumpkins (*Cucurbita pepo*), fruit of certain variety of squash, rich in beta carotene. As human body changes this beta carotene antioxidant to vitamin A which is a requirement to see (for vision). In this study beneficial effect of pumpkin (*Cucurbita pepo*) towards cataract condition is reviewed.

KEYWORDS: *Cucurbita pepo*, beta carotene, Cataract, Vitamin A, AMD.

INTRODUCTION

Cataract is a pathological condition causing clouding of the lens in your eye. The lens of the eyes are normally clear, when clouding occurs, it keeps light rays from passing through the lens and focusing mainly on the retina. The eye is composed of different structures like eyeballs, conjunctiva, cornea, lens, Retina, optic nerve, Sclera, Uvea, Orbit. The retina is a thin layer of nerve tissue that lines the inside of the back of the eye which is sensitive to the light.^[1,2]

A cataract happens when the proteins in the lens of the eyes start to break down and clump or adhere together. This causes the lens to become cloudy and that may affect the eyesight. It can affect one or both eyes but cannot spread from one eye to the other.^[2]

Pumpkins almost all parts are edible which includes, seeds, leaves, flower and fleshy shell. There are many beneficial activity of pumpkin.

The orange pigment of pumpkin are produced by carotenoids, these foods can be eaten raw but more health benefits are produced when it is boiled or baked first, these contains beta carotenoids and vitamin A, which are considered Good for the eyes.^[3]

EPIDEMIOLOGY

The prevalence of cataracts increases with age, ranging from 3.9% among 55- 64 years to 92.6% among those 80 years and older. In 2010, there were 10.8 million people with cataract blindness, this number is expected to increase to 40 million people in 2025. The earliest documented case of cataract was reported to be in a museum in Cairo that houses a small statue from the 5th Dynasty about 2457-2467 B.C.E. The wooden statue of a priest reader clearly has a white patch carved into the pupil of the left eye and it is then represented as cataract.^[4,5]

ETIOLOGY

1. Genetically transmission which is about 20% cases.
2. Maternal factors such as intrauterine infections (rubella), malnutrition, drug toxicity and damage by radiation up to 20% cases.
3. Metabolic disorders like diabetes, hypothyroidism, and neonatal hypoglycemia.
4. Other causes like birth trauma, placenta hemorrhage, endocrine dysfunction.^[6,7]

SIGNS AND SYMPTOMS

1. Clouded, blurred or dim vision
2. Increasing difficulty with vision at night
3. Sensitivity to light

4. Need brighter light for reading purpose and other activities
5. Fading or yellowing of colors
6. Double vision
7. Halo effect^[6,7]

CAUSES

Most cataracts develop when aging or injury changes the tissue which makes up the eye's lens. Proteins and fibers in the lens starts to breakdown , which cause the vision to become cloudy and haze. Sometimes inherited genetic disorders can increase your risk of cataracts. Cataracts can also be caused by other types of eye conditions, past eye surgery or medical conditions such as diabetes, long term use of steroid medication.^[8]

TYPES OF CATARACTS

NUCLEAR CATARACTS- Cataracts affecting the center of the lens. The lens gradually turns more densely yellow and further clouds the vision. After sometimes the lens may turn into brown

- a) **CORTICAL CATARACTS-** Cataracts that affect the edges of the lens. It begins with whitish, wedge-shaped opacities or streaks on the outer edge of the lens. As the streaks slowly extend to center and interfere with light passing through the center of lens.
- b) **POSTERIOR SUBCAPSULAR-** Cataracts that affect the back of the lens. Forms near the back of the lens , right in the path of light. Tends to progress faster than other types.
- c) **CONGENITAL CATARACTS-** Cataracts you're born with. Some people are born with the cataracts or it develops during the childhood. This may be genetic or due the intra-uterine infection or trauma.^[8]

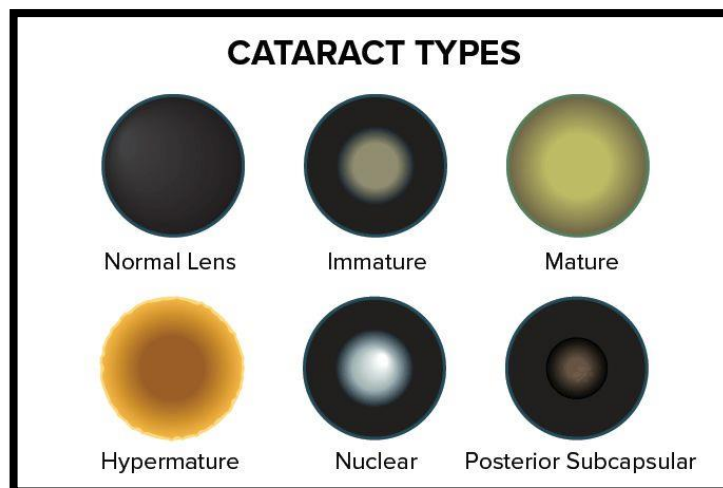


Figure no. 1 types of cataract

RISK FACTORS

- a) Diabetes
- b) Increasing age
- c) Excessive exposure to sunlight
- d) Obesity
- e) Hypertension/ high blood pressure
- f) Previous eye injury
- g) Inflammation
- h) Prolonged use of steroidal medications
- i) Drinking excessive amount of alcohol.^[9]

PATHOPHYSIOLOGY

- 1) **Cortical cataracts**-Decrease in the function of active pump transport in the lens. Reversal of sodium potassium ratio, which increases the sodium(Na) in the cells, retention of water , decrease in the synthesis of protein in lens fibers which eventually decrease amino acid levels which leads to denaturation of proteins and opacification of lens.
- 2) **Nuclear cataract**- age related changes(nuclear sclerosis), dehydration, hardening of the lens and causes degeneration of lens fibres. ^[6]

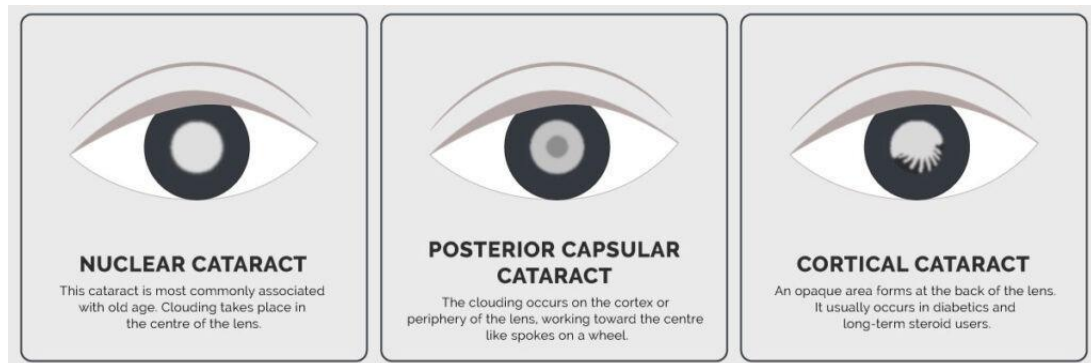


Figure no. 2 pathophysiology

PREVENTION

- a) Have regular eye examination
- b) Quit smoking
- c) Manage or controlling other health problems
- d) Opting a healthy diet that includes plenty of fruits and vegetables.
- e) Wear sunglasses
- f) Reduce excessive consumption of alcohol.

MANAGEMENT

A. Non-surgical

- i. **Glasses:** cataract alters the refractive power of the natural lens so the glasses will allow good vision to be maintained. Usage of darker glasses helps in keeping pupil bigger.
- ii. **Medical treatment:** to delay the progression of cataract.
 - Aldose reductase inhibitors: oral aspirin 50-100mg/kg orally.
 - Quercetin 200-400 mg/kg.
 - Antioxidants : beta carotene , alpha tocopherol, vitamin-c.
 - Membrane stabilizing agent: benzadac and benzyl alcohol.
 - Iodides of calcium, potassium.

B. Surgical removal: this is performed when visual acuity can't be improved with glass.

- **Extra- capsular(extracapsular cataract extraction or ECCE):** This procedure consist of removing the lens but leaving the majority of the lens capsule intact.
- **Intra-capsular(intracapsular cataract extraction or ICCE):** this involves removing the entire lens of the eye, including the lens capsule but it is rarely performed in modern practice.^[7]

PUMPKIN (*Cucurbita pepo*)

Pumpkin is a plump, nutritious orange vegetable; it is highly nutrient dense food. It is low in calories but rich in vitamins and minerals. *Cucurbita pepo* belongs to the family cucurbitaceae. Pumpkin is an annual plant with short cycle grown commonly in the tropics between March and June.^[3,10]



Figure no. 3 Pumpkin

DESCRIPTION

Botanically pumpkin fruits are a type of berry known as pepo. They normally large, 4-8 kg but there are some varieties which are small in size. Pumpkins are often yellowish to orange in color and they vary from oblate to globular to oblong. The rind which is smooth and lightly furrowed or ribbed. The fruit stem is hard and woody, ridged and angled. The fruits mature in early autumn and can be stored for a few months in a dry place. The seeds of pumpkin species are edible and are commonly roasted. Its native to North America and is a very popular ingredient in many dishes. Pumpkins leaves that grow on hollow stems. They are roundish in shape and often have serrated edges.^[10,11,15]

CULTIVATION

Pumpkins are grown in the tropics from the lowlands up to 2500m altitude. They are warm-season crops which is adapted to mean temperatures of 18-27°C. Pumpkins and squashes respond very well to medium to heavy applications of compost or well-decomposed manure. They can be cultivated on almost any fertile, well-drained soil with a neutral or slight acid reaction (pH 5.5 to 7). They are drought-tolerant, require relatively little water, and are sensitive to waterlogging. Excessive humidity is harmful because of the development of leaf diseases, so none of the species do well in the humid tropics.

PLANTING PROCEDURE

Pumpkins and squashes are grown from seed. Seeds may be sown in containers and transplanted to the field at 10 cm high. Direct seeding of 2 to 3 seeds per hill is commonly practiced. Trailing types are planted at distances of 2-3m, the seed requirement is 2 to 3 kg/ha. The bushy types (mainly *C. pepo*) are planted closer, for example, plants spaced 60 to 120 cm in rows 1 to 1.5 m apart; the seed requirement is 3 kg/ha for pumpkin and 7 kg/ha for summer squash (*C. pepo*). Do not use seeds from plants where edible pumpkins and ornamental gourds are grown close together. Offspring will be bitter or even inedible.

HARVESTING

Winter squashes and pumpkins are picked when mature in once-over harvest or in several rounds, about 90 to 120 days after planting depending on the variety. Pumpkins are considered to be among the most efficient vegetable crops when evaluated on nutritional yield land area and labor needed. Indicative figures for the seed yield of *C. pepo* are 400 to 1500 kg/ha. A valuable source of oil and protein is thus neglected if the seeds are left unutilized.^[11]

BENEFICIAL ACTIVITY OF PUMPKIN

SHARPEN EYE SIGHT

A cup of pumpkin can give you 200% of your recommended daily vitamin A intake. If you get it, your eyes will thank you. Vitamin A helps you have healthy eyes and see more clearly, especially in low-light conditions.

CURB YOUR CANCER RISK

Pumpkin's vitamin A kick brings another biggie: a lowered risk of certain kinds of cancer, like lung or prostate cancer.

BOOST YOUR IMMUNITY

In addition to beta carotene, pumpkins offer vitamin C, vitamin E, iron, and folate -- all of which strengthen your immune system. More pumpkin in your diet which can help your immune cells work better against off germs and speed healing when you get a wound.

HELP HYPERTENSION

Pumpkin's rich orange color is also a sign it's packed with potassium. This is crucial for lowering blood pressure. Unsalted pumpkin seeds are also crammed with minerals and plant sterols that raise HDL cholesterol levels (the "good" kind) and help keep blood pressure numbers down, too.

SOOTHE SKIN

The antioxidant power of beta carotene in pumpkin works to combat the effects of aging on your skin. It also helps ease inflammation, which keeps your skin and your body calmer and happier.

HELP THE HEART

The odds of heart disease go down as your fiber intake goes up, and pumpkin is loaded with it. But it isn't just the fiber that takes care of your ticker: The vitamin A and potassium you get when you add pumpkin to your diet also play a part in heart health.^[12]

PUMPKINS FOR EYE HEALTH

Pumpkins are rich in vitamin A and vitamin C. Vitamin C can lower the risk of macular degeneration and from cataracts, which are the principal causes of adult onset blindness. Vitamin A, in combination with vitamin C, zinc, copper, and vitamin E, appears to decrease a person's risk of AMD (age-related macular degeneration). A study subsidized by the National Eye Institute found that people taking a multiple vitamin daily which contained vitamin C and vitamin A (beta carotene) reduced their risk of getting advanced macular degeneration by 25% over a 6 year period.

PUMPKINS -HIGH IN ZINC

Each ounce of pumpkin seeds has approximately 2 milligrams of zinc. The USFDA (US Food & Drug Association) recommends that men and women consume 8 to 11 milligrams of zinc per day. Zinc not only enables vitamin A to navigate from the liver to the retina to form melanin (it is an eye-protecting pigment), it also slows progression of age-related macular degeneration, and helps to reduce the loss of visual sharpness by 19%.

PUMPKINS ARE A FANTASTIC SOURCE OF ANTIOXIDANTS ZEAXANTHIN AND LUTEIN

Lutein and zeaxanthin are powerful carotenoids and antioxidants which help to filter out high-energy damaging light wavelengths, basically playing the part of a sunscreen for eyes. Carotenoids are responsible for giving a pumpkin its beautiful orange pigment, as well as strengthening your eyes and protecting them against macular degeneration.^[13]

PUMPKIN AND ANTI-CATARACT ACTIVITY

Many studies have been reported the association of cataract and foods, including vegetables. A meta-analysis indicated that higher consumption of vegetables might reduce cataract risk. Prospective cohort studies reported that the intake of vegetables and fruits, which include lutein, vitamin C, and vitamin E, may reduce the risk of cataracts, and that vegetarians had lower risk of cataract than meat eaters among British residents.

Lens opacities in cataracts may occur due to the lens protein damage by oxidative stress due to smoking, ultraviolet (UV) radiation exposure, steroidal medications, diabetes mellitus, and high body mass index.

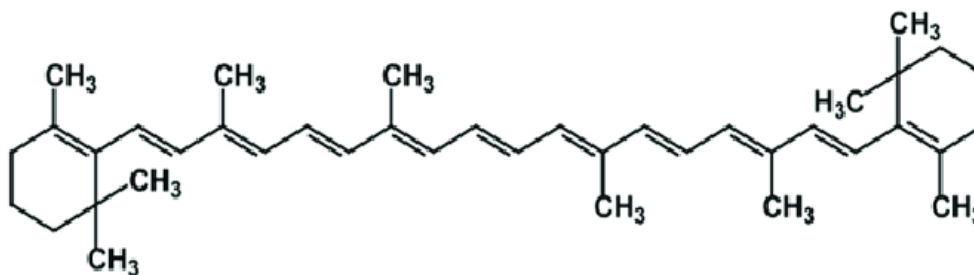
Accordingly, it has been speculated that high doses of antioxidants, such as vitamin A, vitamin C, vitamin E, and β -carotene, may help prevent age-related cataract formation. Moreover, a recent study reported that cruciferous vegetables containing isothiocyanates protect lens cells against oxidative stress.

Beta-carotene is a part of a subtype of Vitamin A known as a carotenoid, or a dark coloured pigment. There are over 500 types of carotenoids, in addition to beta-carotene, each of which can be found in fruits, vegetables and other foods.

The specific color of the beta-carotene pigment is orange-yellow. Some of the most notable sources of beta-carotene include apricots, carrots, pumpkins

After the body absorbs beta-carotene, it converts it into vitamin A, which supports several components of health. It is essential to consume beta-carotene to support your vision and overall well-being.

The body converts beta-carotene into vitamin A which protects the surface of the eye ([cornea](#)) and provides a barrier against bacteria for the mucous membranes and skin. In doing so, vitamin A helps prevent [eye infections](#). Vitamin A is also part of a compound called rhodopsin which is very crucial for eyes being sensitive to light and dark.



Research has shown that beta-carotene can have several benefits for your vision:

- Preventing [night blindness](#).
- [Reducing the risk of age-related macular degeneration \(AMD\)](#).
- Preventing [dry eyes](#).
- Improving [retinitis pigmentosa \(RP\)](#).

Prevents night blindness

Night blindness (nyctalopia) is a condition that makes it significantly difficult to see in low-light conditions. This can be caused by several underlying problems such as [cataracts](#), [near sightedness \(myopia\)](#) and [glaucoma](#). It can also be caused by a deficiency of vitamin A.

While a vitamin A deficiency can contribute to night blindness, research has found that taking supplements of beta-carotene and increasing your intake through your diet can improve symptoms.

Reduces the risk of age-related macular degeneration(AMD)

Age-related macular degeneration (AMD) is a condition in which vision becomes blurry over time as central vision is lost. The condition most commonly affects people over 50 years and older and can affect one or both eyes.

There is no cure for AMD, but some treatments can delay its progression, and in some cases, improve the vision. In fact, research shows that high blood levels of beta-carotene and other carotenoids can reduce the risk of developing advanced AMD by over 30%.

Additional research has shown that the risk of AMD can be lowered in smokers when they eat a diet with plenty of fruits and vegetables that are packed with beta-carotene. Eating foods that are rich in alpha-carotene and [vitamin C](#), in addition to beta-carotene, also helps prevent AMD.

Prevents and treats dry eyes

A lack of vitamin A in the body can have negative effects, such as dry skin and dry eyes. Since the body converts beta-carotene into vitamin A, such dryness can be relieved simply by getting enough beta-carotene in your diet.

Research has also shown that eye drops that contain vitamin A are a sufficient way to help lubricate eyes and treat dry eye syndrome. Studies even suggest that over-the-counter eye drops containing vitamin A are just as effective for treating dry eye syndrome as more expensive prescription eye drops designed for dry eye relief.

Improve retinitis pigmentosa

Retinitis pigmentosa is an inherited eye condition that causes the light-sensitive retina to degenerate slowly and progressively, eventually leading to blindness.^[14]

CONCLUSION

As most of the studies have confirmed the beneficial requirement of eyesight from improving the utilization of the nutrients found in the Pumpkin and other carotenoids which reduces the risk of cataracts as well as age-related macular degeneration. The vitamin A found in the pumpkin contributes towards the promotion of good eyesight, protects the cornea and improves the ability to see better in low light conditions, maintain healthy retina where zinc play a vital role in producing the pigment called melanin. Pumpkins are delicious way to add much needed nutrients into diet. Protect your eye by modifying the diet by adding pumpkin pie.

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