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# Visual Threshold For Cataracts Surgery

A sixth stage project submitted to the  
Department of Surgery

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A great thanks to my teacher Dr. Zainab Nadom for helping me out at every stage of the research to complete my thesis.

# Abstract :

## Background:

Cataract is a common condition of later life affecting the lens of the eye. If left untreated, they can cause a gradual loss of clarity of vision, which can have a large impact on the quality of life of many people, It is an important public health issue since it impairs and limits the Career Choices of those affected, currently the only effective treatment is surgery.

**Aim:** To Detect the visual threshold for patients undergoing cataract surgery at AL-Emamain AL-Khadhumain medical city.

**Methodology:** This is a Retrospective study that was carried out at AL-Emamain AL-Khadhumain medical city, Baghdad , Iraq.

Patients in this study were 120 who complained from visual impairment due to cataract.

The patients were of both sexes between the age of 30-80 years old attended ophthalmology department .this study lasted about 3 months from 15<sup>th</sup> of December 2018 till the 20<sup>th</sup> of March 2019.

**Result:** Data of 120 cases were analyzed according to the age of the patients who complained from cataracts and the results were as follows :

Data collected from 120 cases show more females 66 (55%) and males 54 (45%), the most common type of cataract was nuclear sclerotic cataract 45 (37.5%),Mixed cataract 42 (35%), posterior subcapsular cataract 18 (15%), Brunscent cataract 9 (7.5%),Cortical cataract 6 (5%), Visual impairment , Mild visual impairment is the most common 63 (52.5%) , Moderate visual impairment 45 (37.5%) , Severe visual impairment 12 (10%). The most common type of cataract surgery was phacoemulsification surgery (60%) , extracapsular cataract surgery (40%).

**Conclusion:** Cataract is most common in female than male above 60 years old, and nuclear cataract is the most common type of cataract and causes mild visual impairment.

# Introduction :

## Cataract:

Cataract is a clouding that develops in the crystalline lens of the eye or in its envelope a common condition of later life. If left untreated , they can cause a gradual loss of clarity of vision. Which can have a large impact on the quality of life of many people. It can vary degree from slight to complete opacity and obstruction to the passage of light. The power of the lens may be increased, causing near-sightedness (myopia), and the gradual yellowing of the lens may reduce the perception of blue color. Cataracts typically progress slowly to cause vision loss and are potentially blinding if left untreated. The condition usually affects both eyes but almost always one eye is affected earlier than the other. A senile cataracts, occurring in the aged, is characterized by the initial opacity in the lens, subsequent swelling of the lens and final shrinkage with complete loss of transparency.<sup>(1)</sup>

Moreover, with time the cataracts cortex liquefies to form a milky white fluid in a morgagnian cataracts, which can cause severe inflammation if the lens capsule ruptures and leaks.

Untreated, the cataracts can cause phacomorphic glaucoma. Very advanced cataracts with weak zonules are liable to dislocation anteriorly or posteriorly. Cataracts derived from

the Latin cataracts meaning which is “waterfall” and the Greek kataraktes and katarrhaktes, from katarassein meaning “to dash down” (kata-,”down”; arassein, “to strike, dash”. As rapidly running water turns white, the term may later have been used metaphorically to describe the similar appearance of mature ocular opacities. In Latin, cataracta had the alternate meaning “portcullis” ,so it’s also possible that the name came about through the sense of “obstruction”. In dialect English a cataracts is called a pearl, as in “pearl eye” and “pearl-eyed”.(2)(3)(6)

## Symptoms:

During the early stages, cataract may have little effect on vision. Symptoms vary due to the location of the cataract in the eye (Nuclear, Cortical, or posterior sub capsular).

Depending on the type and extent of the cataract, patients may experience the following symptoms:

1. Cloudy vision.
2. Double or blurry vision .
3. Glare and sensitivity to bright lights.
4. Colors appear faded.
5. Difficulty reading due to reduced black-white contrast.
6. Difficulty driving at night. (8)

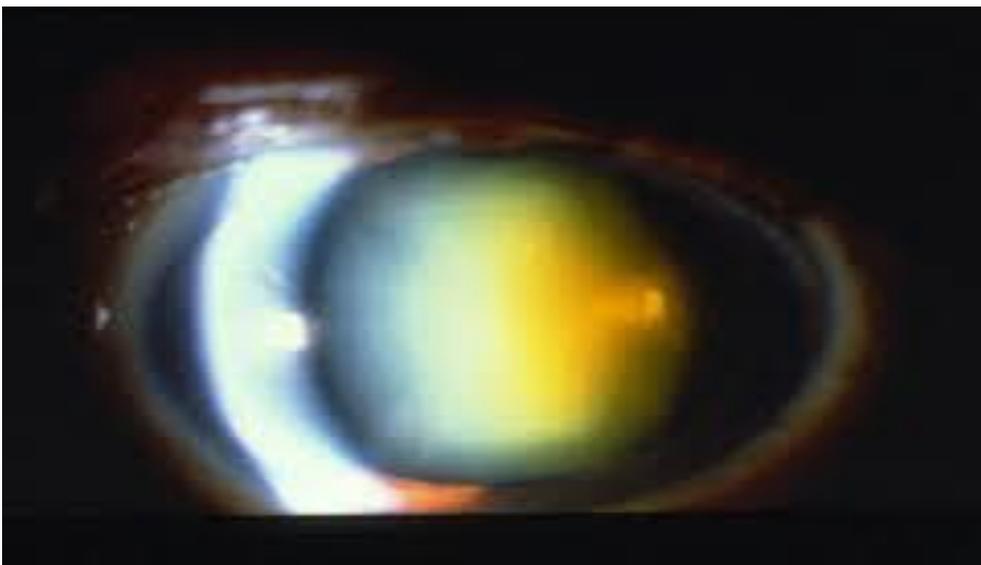
## Risk factors for cataract include:

1. Age.
2. Diabetes.
3. Smoking.
4. Overexposure to sunlight.
5. Certain medications, such as steroids.(7)

## Types of cataract according to anatomy:

Cataracts can form in any of the three parts of the lens and are named by their location.

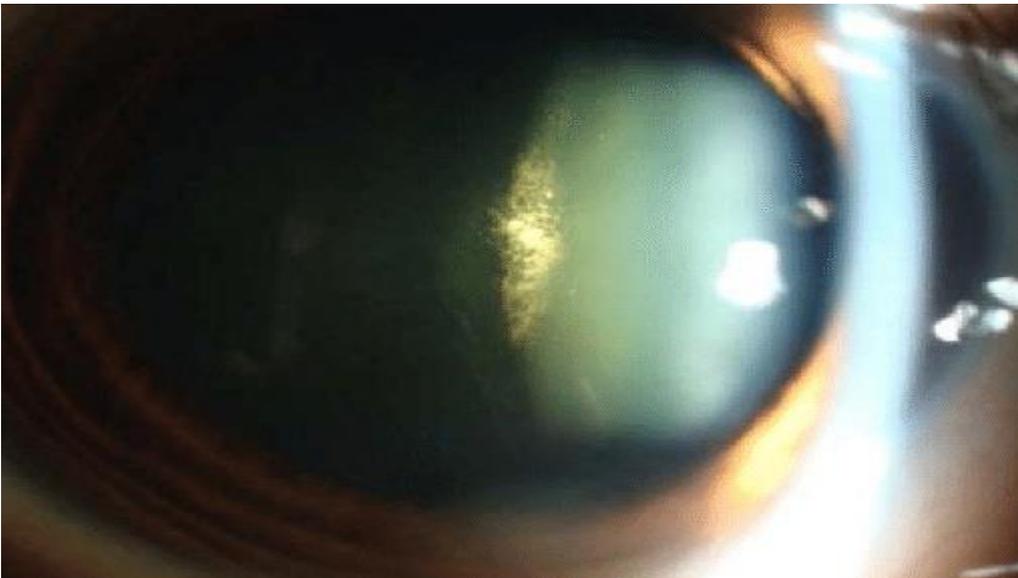
- Nuclear cataracts: These form in the nucleus (the inner core) of the lens. This is the most common type of cataracts associated with aging process.



- Cortical cataracts: These form in the cortex (the outer section of the lens).(8)



- Posterior sub capsular cataracts: These form towards the back of the capsule that surrounds the lens. They are more in people with diabetes, those who are overweight, and those taking steroids.



## Pathophysiology of Cataract:

The mechanism of cataract formation is multifactorial and, therefore, difficult to study. Oxidation of membrane lipids, structural or enzymatic proteins, or DNA by peroxides or free radicals induced by UV light may be early initiating events that lead to loss of transparency in both the nuclear and cortical lens tissue. In cortical cataract, electrolyte imbalance leads to over hydration of the lens, causing liquefaction of the lens fibers. Clinically, cortical cataract formation is manifested by the formation of vacuoles, clefts, wedges, or lamellar separations that can be seen with slit lamp. Age-related PSCs are created by loss of lens fiber nuclei and replacement of epithelial cells that aberrantly migrate towards the posterior pole. These epithelial cells cluster, form balloon cells, and interdigitate with adjacent lens fibers and the deeper cortical fibers, breaking them down. The result is the lacy, granular, iridescent appearance of PSCs.<sup>(8)(9)</sup>

## Cataracts surgery, recovery and complications:

Currently the only effective treatment is surgery. The aims of cataracts surgery are to improve visual acuity and to improve the vision-related quality of the patient's life.

Cataracts can be treated by removing the cloudy lens and replacing it with an artificial plastic lens (an intraocular implant). Cataracts surgery can be carried out in three ways, but each technique is dependent on severity of the trauma that necessitated the surgery. The techniques are:

**1. Phacoemulsification:** involves breaking the cataracts into small pieces using ultrasound and the fragments are sucked through a thin tube. The same incision is used to insert a replacement lens and functions like the extracted natural lens.

**2. Extracapsular cataract surgery:** this technique is adopted when the cataracts are at an advanced level and cannot be broken down using phacoemulsification. It is performed under local anesthesia and the doctor may recommend oral sedatives to relax the patient. The surgeon makes a small incision in the eye to remove the defective lens.

**3. Intracapsular cataract surgery:** this type of surgery involves creating a relatively larger incision than the other techniques. This technique is mostly used for people with

extreme trauma. The larger incision makes it possible for the surgeon to remove the lens fully and in its place put an artificial lens. Although cataract surgery is considered a low risk procedure, some complications have been reported including posterior capsular opacification (PCO) resulting from additional cell growth in the lens and Cystoids Macular Oedema resulting from fluid build ups between the layers of the retina. Other common complications include retinal detachment, inflammation, cornea damage and eye infections.(8)

## Epidemiology:

Age-related cataract is responsible for 48% of world blindness, which represents about 18 million people, according to the World Health Organization (WHO). In many countries surgical services are inadequate, and cataracts remain the leading cause of blindness. As populations age, the number of people with cataracts is growing. Cataracts are also an important cause of low vision in both developed and developing countries. Even where surgical services are available, low vision associated with cataracts may still be prevalent, as a result of long waits for operations and barriers to surgical uptake, such as cost, lack of information and transportation problems.(9)

# Aim of study:

To Detect the visual threshold for patients undergoing cataract surgery at AL-Emamain AL-Khadhumain medical city.

# Patients and Method:

This is a Retrospective study that was carried out at AL-Emamain AL-Khadhumain medical city, Baghdad , Iraq.

Patients in this study were 120 who complained from visual impairment due to cataract.

The patients were of both sexes between the age of 30-80 years old attended ophthalmology department .this study lasted about 3 months from 15<sup>th</sup> of December 2018 till the 20<sup>th</sup> of March 2019.

## EXCLUSION CRITERIA:

- 1.Fundus pathology (Visual impairment).
- 2.Congenital Cataracts.

## Data collection:

The data collected by reviewing the patients medical records whom underwent cataract surgery about (name ,age ,sex), The best corrected visual acuity (Pre operative BCVA) and the state of the fellow eye.

## Definitions

Mild visual impairment : a visual acuity of 6/9 - 6/18.

Moderate visual impairment : a visual acuity of 6/24 - 6/36.

Severe visual impairment : a visual acuity of 6/60 and less.(19)

# Results:

Data of 120 cases were analyzed according to the age of the patients who complained from cataracts and the results were as follows :

Data collected from 120 cases show more females 66 (55%) and males 54 (45%), the most common type of cataract was nuclear sclerotic cataract 45 (37.5%), Mixed cataract 42 (35%), posterior subcapsular cataract 18 (15%), Brunscent cataract 9 (7.5%), Cortical cataract 6 (5%), Visual impairment , Mild visual impairment is the most common 63 (52.5%) , Moderate visual impairment 45 (37.5%) , Severe visual impairment 12 (10%).

The most common type of cataract surgery was phacoemulsification surgery (60%) , extracapsular cataract surgery (40%).

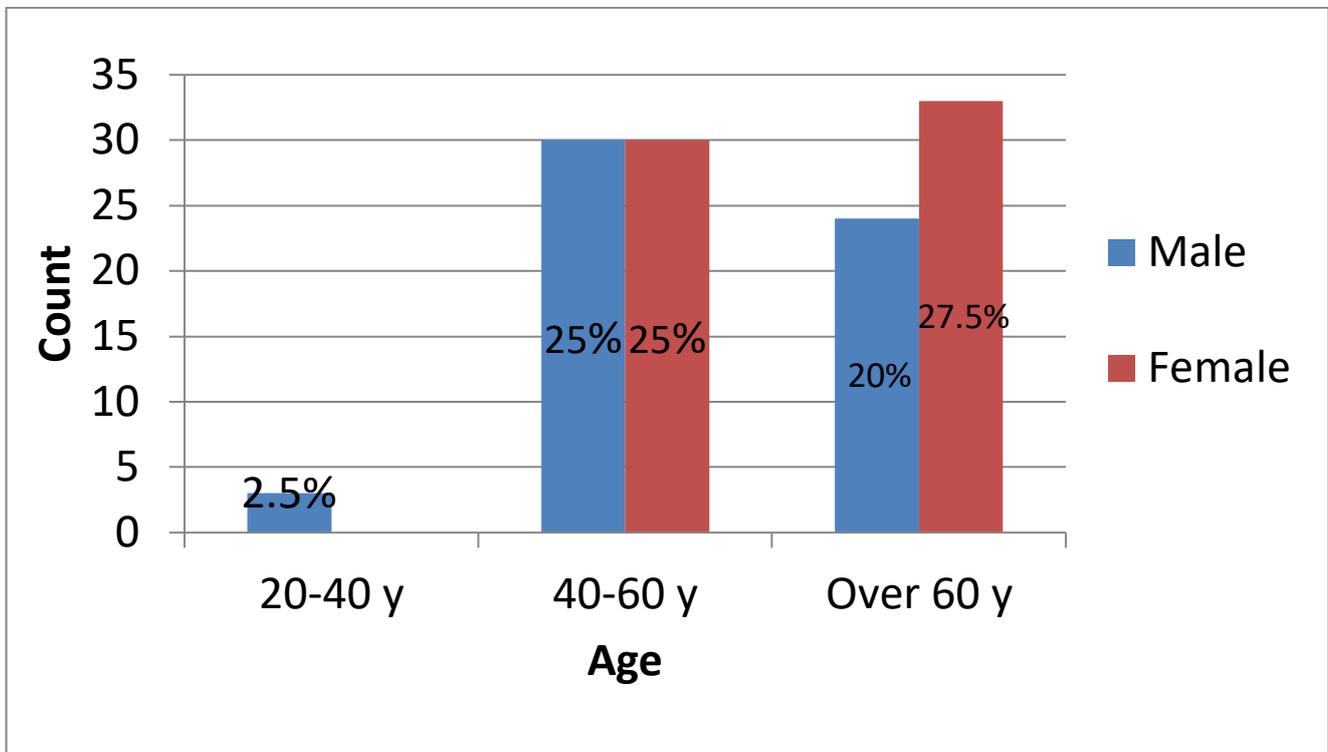


Figure 1 : Age and gender distribution among patients.

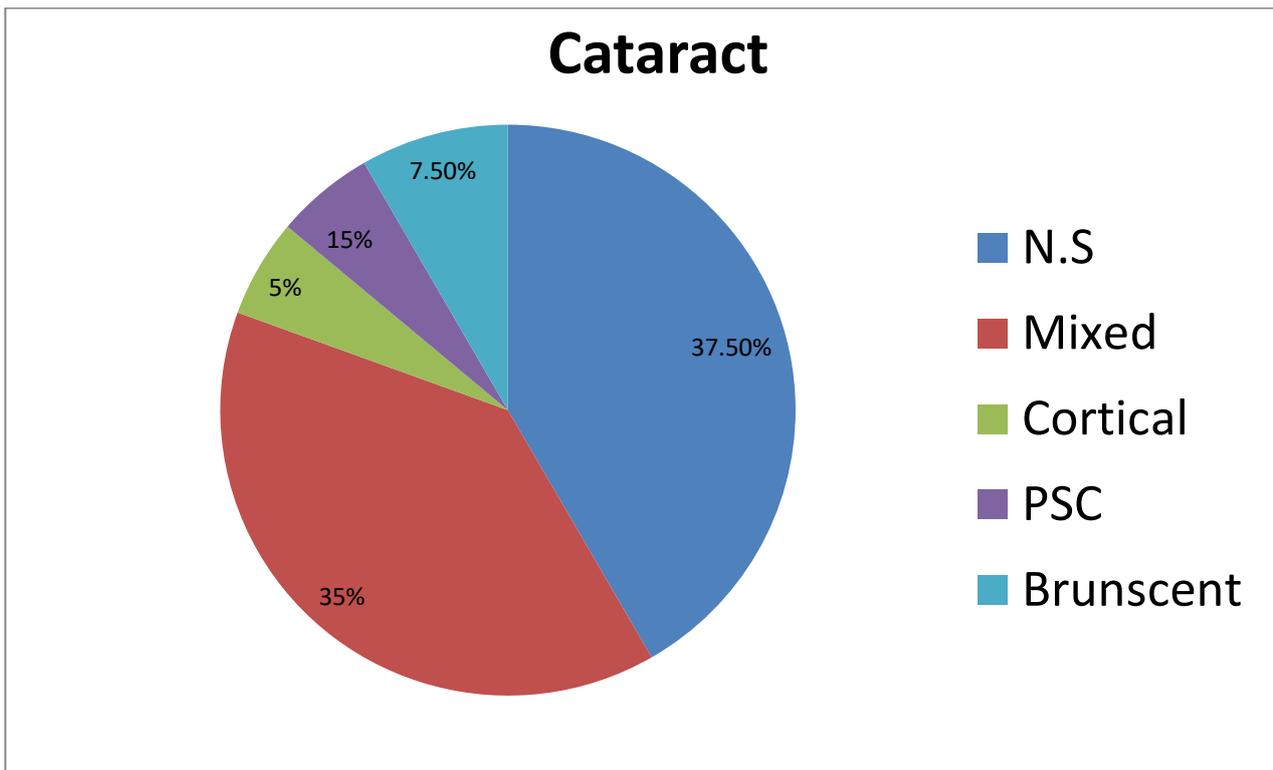
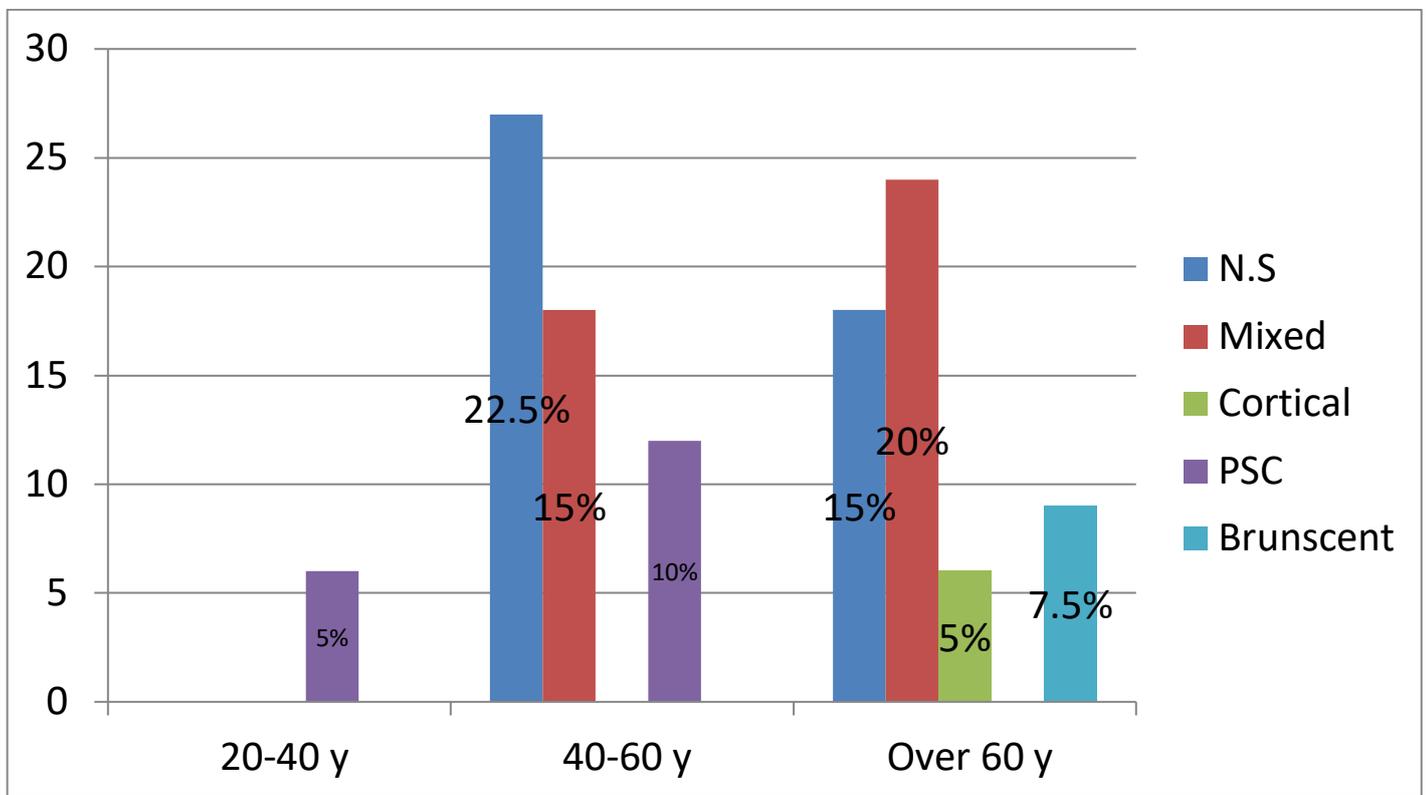
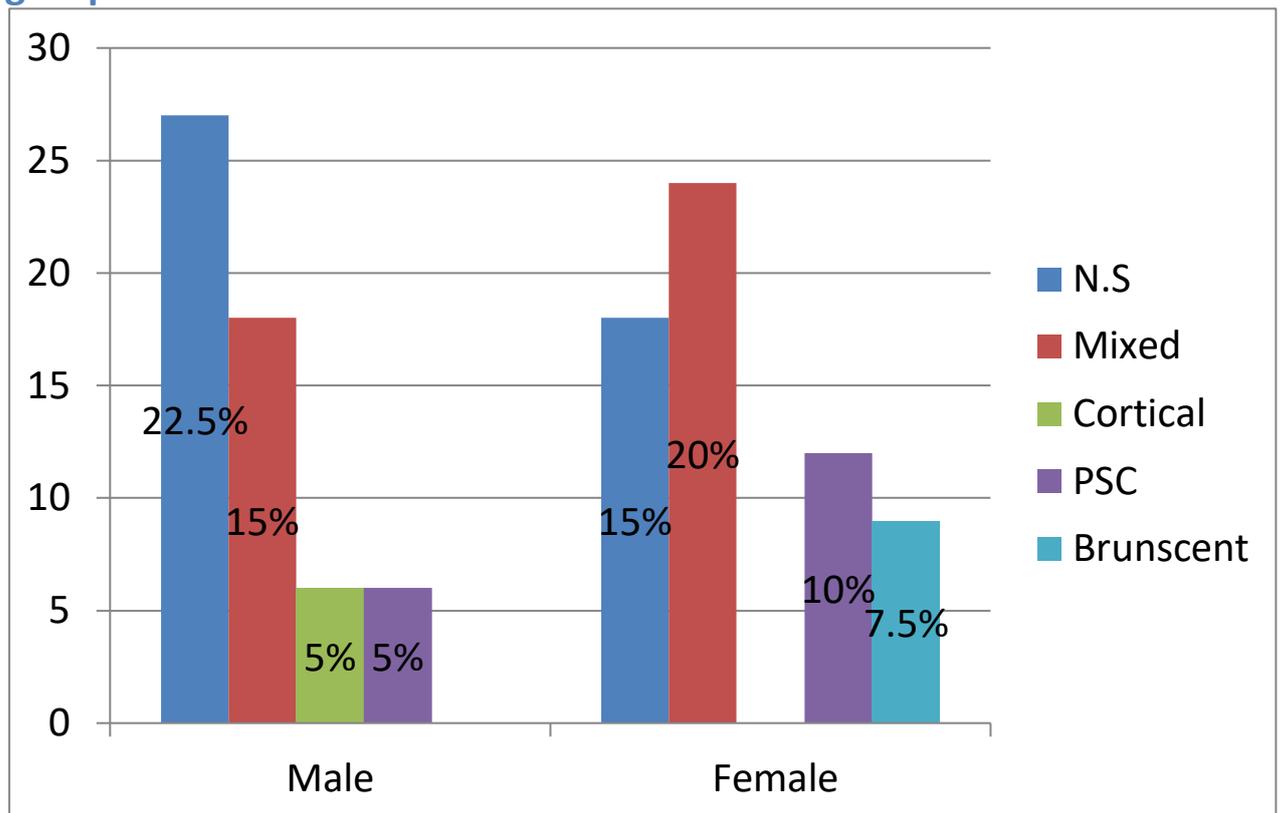


Figure 2: The percentage of the types of cataract.



**Figure 3: Distribution of types of cataract among different age groups.**



**Figure 4: Distribution of types of cataract in both genders.**

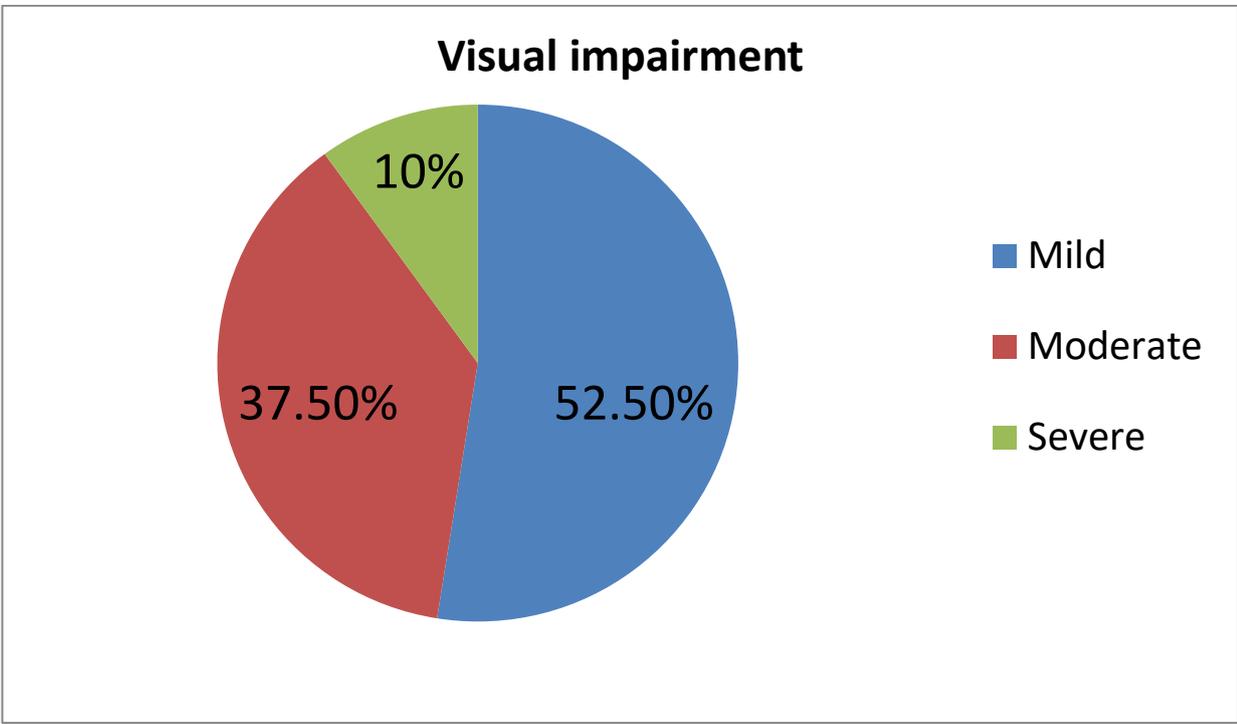


Figure 5: Level of visual impairment (VI).

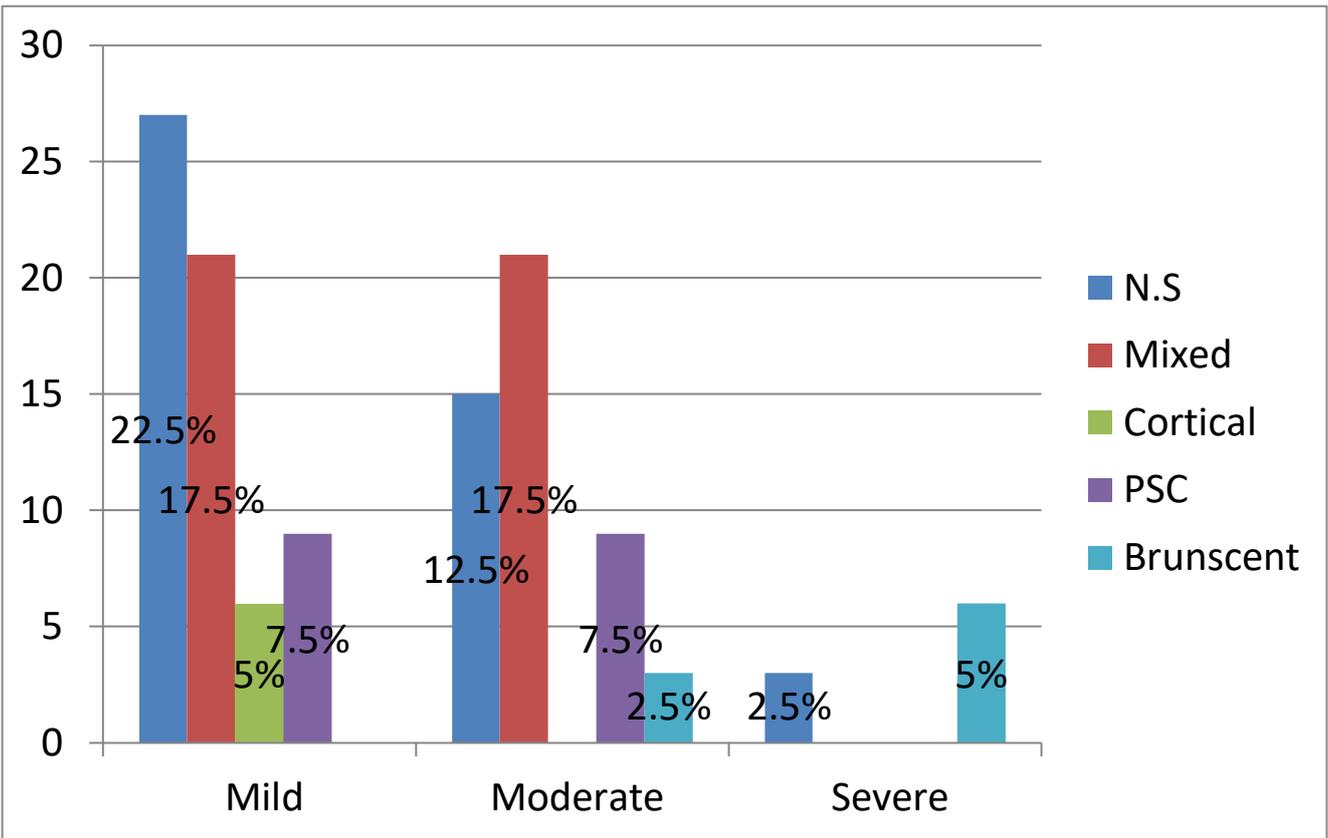


Figure 6: type of cataract in relation to patients visual impairment.

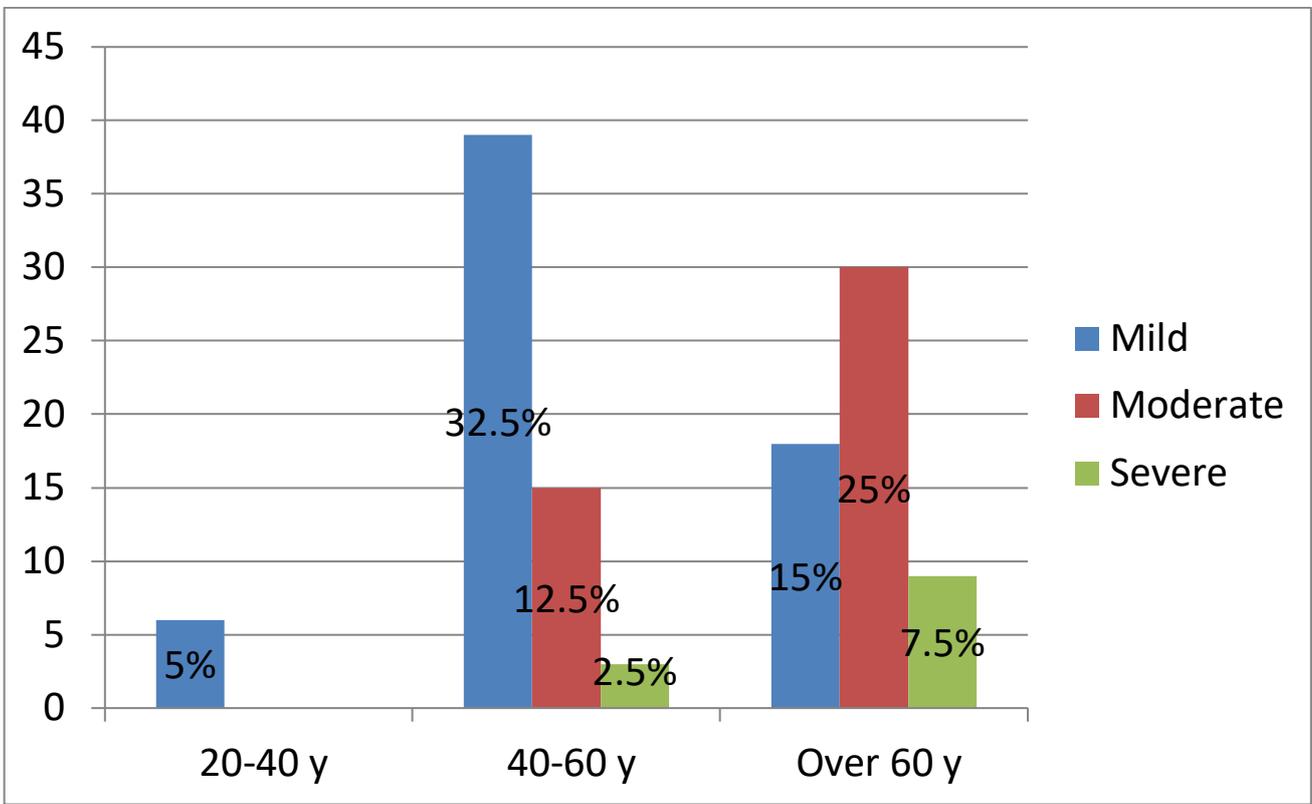


Figure 7: Visual impairment according to patients age.

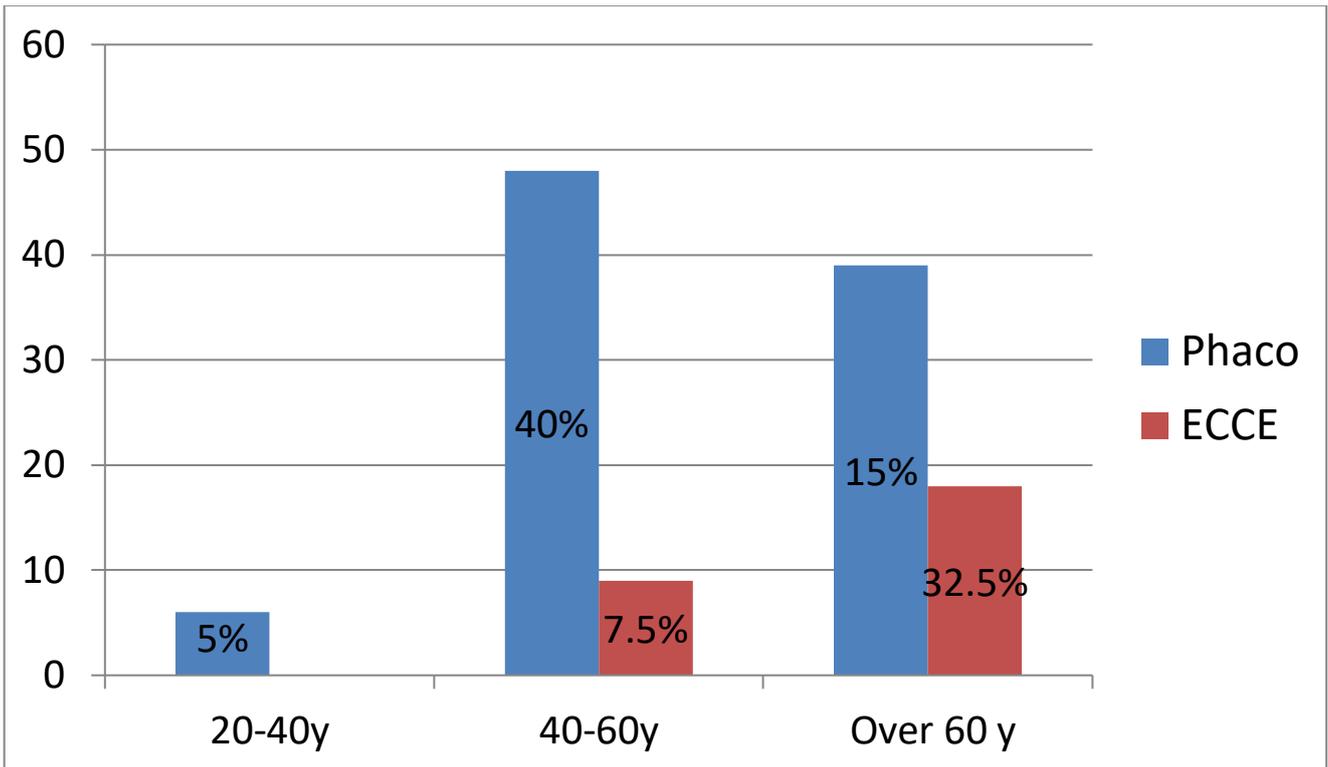
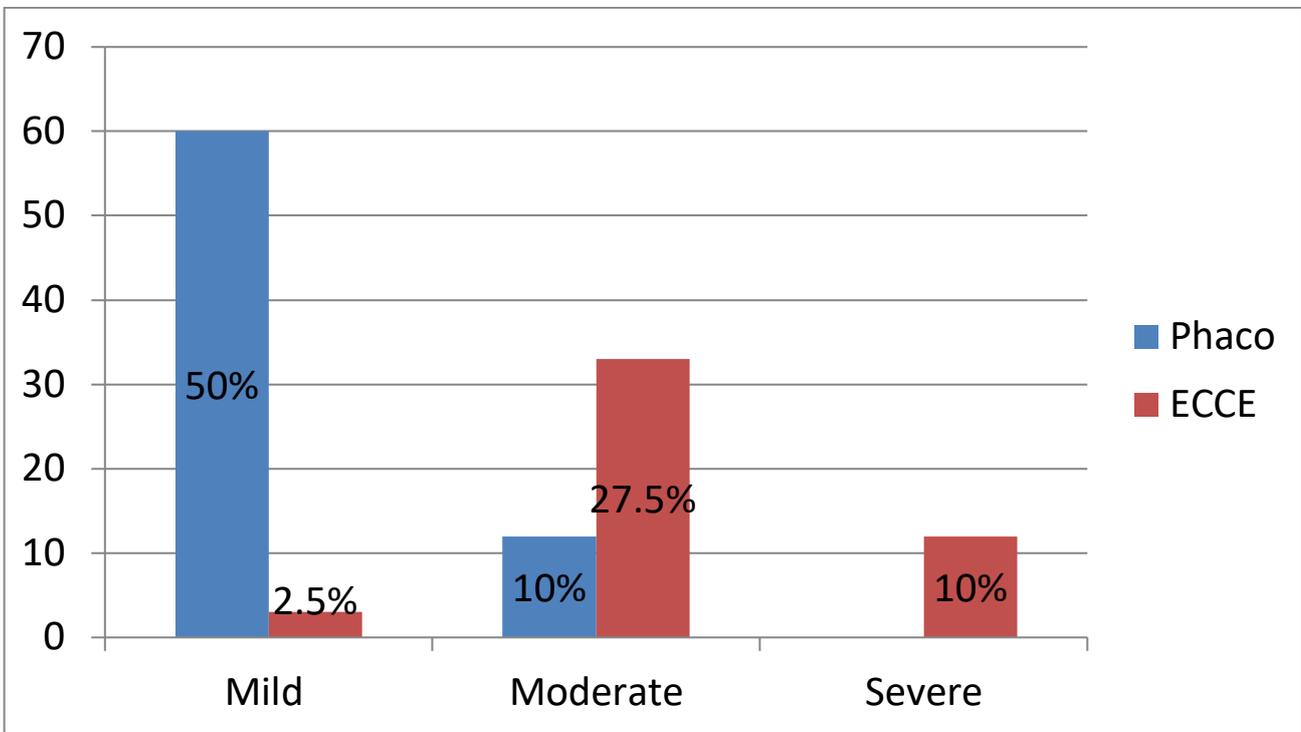


Figure 8: Type of surgery according to patient's age.



**Figure 9: Type of surgery according to patient's visual impairment(visual threshold).**

# Discussion:

Cataracts is one of the most common causes of visual impairment, and visual impairment is an important public health issue since it limits the career choices/job opportunities of those affected, thus constituting a socioeconomic burden on society.<sup>(18)(19)</sup>

Therefore it is important to know the prevalence and causes of cataract and how to be investigated so that health authorities may have relevant values that can help them in making informed decisions with regards to prevention and management programs.

Most of the cases in this study were females (55%), and males (45%).

In this study the most common type of cataract is Nuclear cataract (37.5%) and causes mild visual impairment, Posterior sub capsular cataract (15%) and causes mild to moderate visual impairment, Cortical cataract (5%) is the least common type causes mild visual impairment, while other study suggest, the most common type of cataract was nuclear cataract (61%) and causes mild visual impairment, cortical cataract (20%) causes moderate visual impairment, posterior sub capsular (19%) causes severe visual impairment.

Other studies suggest that mild visual impairment was the most common (61%), (57%) and severe visual impairment was the least common respectively (19%),(21%). (12)(13)

## Threshold for cataract surgery:

Unless one or more of the following criteria are met, a best corrected visual acuity of better than 6/12 in the affected eye will not normally be funded:

- Patients who are still working in an occupation in which good acuity is essential to their ability to continue to work (e.g. watchmaker) OR
- Patients with posterior sub capsular cataract and those with cortical cataracts who experience problems with glare and reduction in acuity in daylight or bright conditions OR
- Patients who need to drive at night who experience significant glare due to cataracts which affects driving OR
- Difficulty with reading due to lens opacities OR
- Patients with visual field defects borderline for driving, in whom cataract extraction would be expected to significantly improve the visual field OR
- Significant optical imbalance (anisometropia or anisekonia) following cataract surgery on the first eye OR
- Patients with glaucoma who require cataract surgery to control intra ocular pressure OR

- Patients with diabetes who require clear views with their retina to look for retinopathy OR
- Patients with wet macular degeneration or other retinal conditions who require clear views of their retina to monitor their diseases or treatment ( e.g. treatment with anti-VEGFs).

Referral of patients with cataracts to ophthalmologists should be based on the following indications :

1. The patient has sufficient cataract to account for the visual symptoms.

AND

2. The patient has best corrected visual acuity of 6/12 or worse in the worst eye and the reduced visual acuity is impairing their lifestyle:

A. The patient is at significant risk of falls.

B. The patient's vision is affecting their ability to drive.

C. The patient's vision is substantially affecting their ability to walk.

D. The patient's vision is substantially affecting their ability to undertake leisure activities such as reading, watching television or recognizing faces.

OR

3. The patient has best corrected visual acuity of better than 6/12 in the worst eye but they are working in an occupation in which good visual acuity is essential to their

ability to continue to work e.g. Watchmaker , Micro surgeon. OR

4. the patient has bilateral cataracts, neither of which fulfils the threshold of surgery but which together reduce binocular vision below the DVLA standard for driving.

5.The patient is willing to have cataract surgery:

A.The referring optometrist or GP has discussed the risks and benefits using an approved information leaflet (national or locally agreed) and insured the patient understands and is willing to undergo surgery before reffering.

Criteria for cataract surgery – London

1. Cataract surgery is effective for first and second eyes.
2. Surgery is offered for symptomatic cataract sand is not based on visual acuity.
3. There are no patient related outcome measures that are currently suitable for use in routine clinical practice.
4. Visual acuity represents a quantifiable indicator of visual function that could be used for audit purposes and monitoring surgical activity.
5. Projected demographic trends are likely to necessitate current surgical rates.

## The London Criteria:

1. Cataract surgery to be considered for patients with a best corrected visual acuity of 6/9 or worse in either the first or second eye, AND have impairment in lifestyle such as substantial affect on activities of daily living, leisure activities and risk of falls.
2. Surgery is indicated for management of ocular comorbidityes such as control of glaucoma, view of diabetic retinopathy etc.
3. Patients with cataract having visual acuity better than 6/9 does not imply automatic exclusion. In this circumstance, where there is a clear clinical indication or symptoms affecting lifestyle, surgery should be still considered.

## Second eye surgery in patients with bilateral cataracts:

Second eye surgery will be funded if the criteria above are met again. This should be assessed not earlier than the post-operative review following surgery on the first eye. This policy does not extend to cataracts removal incidental to the management of other eye conditions.

## For patients at significant risk of falls:

If the patient has been deemed at significant risk of falls by specialist falls assessments team and visual impairment due to cataract is deemed to be contributor to the this risk by the specialist team, patients who do not meet the visual acuity criteria above will be considered on an individual patient bases.(20)

# Conclusion and Recommendation:

Cataract is most common in female than male above 60 years old, and nuclear cataract is the most common type of cataract and causes mild visual impairment

## Recommendations:

1. The need for nationwide accurate statistics for prevalence of cataract, visual threshold for cataract Sx, health care facilities for cataract Sx, to develop uniform national criteria for cataractSx.
2. Cataract screening and proper management in term of time and quality.
3. Control the risk factor of cataract , to avoid progression of cataract which include:
  - A. Control of dm
  - B. Control of hypertension
  - C. Avoid exposure to sunlight
  - D. Avoid steroids intake
  - E. Reduce weight
  - F. Avoid alcohol

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