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**Research Tittle : Etiology of visual deterioration in patients  
attending outpatient clinic**

# **Etiology of visual deterioration in patients attending outpatient clinic**

## **Abstract**

### **Background:**

Visual impairment is the most common presenting ocular symptom, which has a variety of causes. This cross section study aims to determine etiology of visual deterioration in patients attending outpatient clinic.

**Material:** 115 patients attending the outpatient clinic in at Al-Imamin Alkadhimiain (As) teaching hospital complaining from decreased or blurred vision

Participants who reported visual impairment, were underwent ophthalmic examinations , included measurements of visual acuity ,ocular refraction, visual fields, and intraocular pressure; slit lamp examination; and direct and indirect ophthalmoscopy nearly most of them underwent such approach , with considering special cases who need further investigations . all patient were asked to response to questionnaire concerning their ophthalmologic history with some of the related questions regarding their medical history.

### **Results:**

62 patients were male while 53 patients were female. 36 patients (31.3%) Have refractive error ; 31 patients (26.95% ) have cataract ; 14 patients (12.2%) have diabetic retinopathy ; 12 patients (10.4%) have glaucoma ; 4 patients (3.5%) optic disc atrophy ; 4 patients (3.5%) have age related macular degeneration ; 2 patients (1.7 %) have vitreous hemorrhage ; 2 patients (1.7%) have central retinal artery occlusion ; 2 patients (1.7%) have crystalline lens dislocation ; other miscellaneous cause form 8 cases (6.95%) .

### **Conclusion:**

Uncorrected refractive error is a major cause of vision impairment , cataract, diabetes mellitus, and glaucoma are another main causes and the causes of visual impairment varies considerably among different age groups.

**Key words :** Visual impairment, vision deterioration.

# Introduction

## Introduction

Visual impairment is the most common presenting ocular symptom, which has a variety of causes ranging from simple and easily corrected with glasses to more serious and sight threatening.<sup>(1)</sup>

Approximately 80% of vision impairment globally is considered avoidable.<sup>(2),(3)</sup> There are effective interventions available to prevent and treat eye diseases.<sup>(4)</sup> For example, uncorrected refractive error can be corrected with glasses while cataract surgery can restore vision.<sup>(5),(6)</sup> Vision rehabilitation is also effective in improving functioning for people with irreversible vision impairment.<sup>(7)</sup>

Patients with certain disorders that cause blurred vision (e.g., acute corneal lesions [such as abrasions], ulcers, herpes simplex keratitis, herpes zoster ophthalmicus, and acute angle-closure glaucoma) are more likely to present with other symptoms such as eye pain and red eye.<sup>(8),(9)</sup>

The causes of visual impairment are relatively age-specific, some age-related eye changes, such as presbyopia, are perfectly normal phenomena and don't signify any sort of disease process.<sup>(10),(13)</sup>

At the same time, cataracts can be considered an age-related disease also; they are extremely common. However, some patients will experience more serious age-related eye diseases that have greater potential for affecting their quality of life as they grow older. These conditions include glaucoma, macular degeneration and diabetic retinopathy.<sup>(11),(13)</sup>

As Decrease vision is the most common visual symptom, having an accurate data for the cause-specific of vision impairment are a fundamental basis of public health policies, such as allocation of resources and health service planning, and are important for prioritization of scientific advances and industry research.

Worldwide the most common causes of blurred vision include, Refractive errors, glaucoma, Cataracts, Diabetic retinopathy, Age-related macular degeneration.<sup>(1)</sup>

Decreased vision causes can be summarized by these four general mechanisms:

- Opacification of normally transparent ocular structures (cornea, lens, vitreous) through which light rays must pass to reach the retina
- Disorders affecting the retina
- Disorders affecting the optic nerve or its connections
- Refractive errors

Deterioration of vision or blurred vision is a problem many patients experience but this may include many different scientific meanings, these are some examples:

- Decrease in peripheral vision - the patient may describe bumping into things or frequent scrapes when parking the car.
- Blurred vision means a single image that is seen indistinctly. Whether this is at distance, near or both.
- Interference with a clear image (e.g., floaters, flashes of light - photopsia).
- Diplopia – means simultaneous perception of two images of a single object that may be displaced horizontally , vertically , diagonally (i.e. , both vertically and horizontally ) , or rotationally in relation to each other. It can be either monocular or binocular .
- Alteration of a clear image - eg, micropsia/macropsia (image appears smaller or bigger) or metamorphopsia (distorted image).
- Other disturbances of vision - eg, iridescent vision (haloes, rainbows), dark adaptation problems or night blindness (nyctalopia), colour vision abnormalities. <sup>(12)</sup>

With this regard, To measure the extent of decrease vision and determine the exact cause it needs a proper history taking, comprehensive [eye exam](#), which include [spatial contrast sensitivity](#), and standard [Snellen eye chart](#) tests, an ophthalmoscope, slit lamp, or both . More details are available if the eyes were dilated with topical tropicamide 1% and phenylephrine 10% ; dilation is nearly full after about 20 min. As much of the fundus as is

visible, including the retina, macula, fovea, vessels, and optic disk and its margins, is examined. To see the entire fundus , Intraocular pressure , Optical coherence tomography (OCT) can also be measured. <sup>(14)</sup>

Diagnoses Reached in many patient by doing some of those mentioned above , while other may need nearly most of these investigation with some other more sophisticated methods to reach the diagnosis .

After all It is estimated that refractive error affects around 1–2 billion people worldwide , which is the most common cause of poor vision overall.

Herein, A comprehensive review of the different causes and sub classification of vision loss will be discussed.

**Refractive error** is a failure of the eye to focus light from an object onto the retina to form a clear image.

It is a frequent cause of reduced visual function. If there is no refractive error when viewing a distant object, the eye is said to be emmetropic. While if there is a refractive error when viewing a distant object, the eye is described as ametropic.

Ametropia can be divided into myopia (syn 'short-sightedness'), hypermetropia (syn hyperopia; 'long-sightedness'), and astigmatism .In Myopia the Light from distant object focuses in front of the retina, thus it needs Concave lens for correction while in Hypermetropia Light from distant object focuses beyond the retina which in turn will need Convex lens. Presbyopia means Loss of normal accommodation ,with failure to focus on near objects need Convex lens addition. Astigmatism means Optical power of eye uneven across different meridians corrected by Toric lens. <sup>(15)</sup>

The second most common cause of visual impairment worldwide is Cataract.

**Cataract** is any opacity within the lens. <sup>(17)</sup>

About 18 million people are bilaterally blind due to cataract and that the condition causes 48% of cases of blindness worldwide. It is important to note that most cases of blindness due to cataract (up to 90%) are found in developing nations.

About 33% of the world's population experiencing decreased vision because of this disorder; only refractive error has a greater impact in this regard. <sup>(16)</sup>

Cataracts are classified according to their morphology and position within the lens and graded by the degree of opacity or 'maturity' produced and by its cause. If lens damage is insufficient to progress to maturity a localized opacity is produced in the injured region that becomes surrounded by new lens fibers as they are laid down beneath the capsule. As people live longer, the prevalence of cataract is expected to rise correspondingly, posing challenges for health systems. Because of their high prevalence, age related cataracts are presumed to have the greatest impact.

The three major types of age-related cataract are nuclear, cortical and posterior subcapsular opacity; many patients have combinations of these. <sup>(17)</sup>

### **Diabetic retinopathy**

the retina is not the only part that affected by diabetes, therefore we had to put in mind these other complications before starting discussing the diabetic retinopathy per se these are

- Common ( Retinopathy, Iridopathy (minor iris transillumination defects, Unstable refraction).



- Uncommon (Recurrent styes , Xanthelasmata , Accelerated senile cataract , Neovascular glaucoma (NVG) , Ocular motor nerve palsies, Reduced corneal sensitivity).
- Rare (Papillopathy, pupillary light-near dissociation, Wolfram syndrome (progressive optic atrophy and multiple neurological and systemic abnormalities). <sup>(18)</sup>

### **Diabetic retinopathy**

The prevalence of diabetic retinopathy (DR) in diabetics patients is probably around 40%. It is more common in type 1 diabetes than in type 2 and sight threatening disease is present in up to 10%. <sup>(18),(19)</sup>

DR is also a major cause of blindness. In the proliferative stage of the disease, newly formed, abnormal blood vessels can break through the retinal surface and hemorrhage into the normally transparent, gelatin-like vitreous in the middle of the eye. Scar tissue may subsequently form and pull the retina away from the back of the eye, causing a retinal detachment to occur. Laser treatment (laser photocoagulation) is a highly effective clinical tool for treating proliferative retinopathy. <sup>(20)</sup>

### **Classification of diabetic retinopathy**

- I. Non-proliferative diabetic retinopathy which can be either :
  - Background retinopathy: Mild changes seen on ophthalmoscopy (usually microaneurysms, small hemorrhages, hard exudates), but no symptoms or changes in vision. Requires no immediate treatment.
  - Maculopathy: Edema and exudates involving the macula. Usually presents as blurring, decreased acuity, darkening, or visual distortion.

Optical coherence tomography can better visualize where the problem is and its severity. This is the number 1 cause of blindness in patient with diabetic retinopathy.

II. Proliferative diabetic retinopathy: More advanced stage of Diabetic retinopathy , and is associated with a poorer outcome. Characterized by neovascularization from optic disk or major vessels.

Associated with vitreous hemorrhaging and tractional Retinal detachment due to fibrosed vessels. Vascular proliferization can involve the anterior structures and block the angle, hence resulting in a glaucoma (neovascular glaucoma) .<sup>(18)</sup>

**Glaucoma** represents a group of diseases defined by a characteristic optic neuropathy that is consistent with excavation and undermining of the neural and connective tissue elements of the optic disc and by the eventual development of distinctive patterns of visual dysfunction. The disease is manifested as a progressive optic neuropathy that, if left untreated, leads to blindness.<sup>(20), (21)</sup>

Glaucoma is a group of diseases that share :

- Increased intraocular pressure (IOP)
- Optic nerve damage (cupping )
- Visual field loss (scotoma)

Glaucoma usually causes no symptoms early in its course, at which time it can only be diagnosed by regular eye examinations (screenings with the frequency of examination based on age and the presence of other risk factors).

Although elevated intraocular pressure (IOP) is one of the primary risk factors, its presence or absence does not have a role in the definition of the disease.

In most individuals with glaucoma, the optic nerve and visual field changes seen with this disease are determined by both the level of the IOP and the resistance of the optic nerve to damage. Although progressive changes in the visual field and optic nerve are often related to elevated IOP, in some glaucoma patients the IOP remains within statistically normal range.

In most cases of glaucoma, it is presumed that the IOP is too high for proper functioning of the optic nerve axons and that lowering the IOP will stabilize the damage. In cases involving other pathophysiologic mechanisms that may affect the optic nerve, however, the optic nerve may continue to be damaged despite lowering the IOP. Preperimetric glaucoma is a term that is sometimes used to denote glaucomatous changes in the optic disc in patients with normal visual fields as determined by white on-white perimetry. Accurate diagnosis of this condition depends on the sensitivity of the visual function test that is used. Thus, the development of new, more sensitive tests may allow earlier confirmation of this form of glaucoma, while the patient is within this preperimetric phase.

Unfortunately, since quality of life is not significantly affected until the later stages of the disease process, a significant proportion of individuals remain either undiagnosed or undertreated. Glaucoma usually begins in midlife and progresses slowly but relentlessly. If detected early, disease progression can frequently be arrested or slowed with drug and/or surgical treatment. <sup>(21)</sup>

Glaucoma is mainly classify into Open-Angle, Angle-Closure, Primary, and Secondary Glaucoma .

primary open-angle glaucoma (POAG), Its most prevalent form. <sup>(20)</sup>

other important causes of visual deterioration is age related macular degeneration , which has prevalence varies between regions some such as united states as the United States National Eye Institute in the national plan for eye and vision research consider AMD as The leading cause of visual loss among elderly persons in U.S with Prospects AMD will become a more prevalent cause of blindness than both DR and glaucoma combined , other studies also consider AMD as the most common cause of blindness in developed countries, particularly in people older than 60 years elderly persons , explained that as it due to the size of the elderly population increases in those countries . <sup>(20) , (23)</sup>

At the same time adequate data are lacking concerning the prevalence of the disease in developing countries. <sup>(24)</sup>

Finally, although macular degeneration, mainly age-related, was estimated to be the cause of 7% of blindness and 3% visual impairment worldwide, cataract and under correction of refractive error represented more than 50% of all cases. <sup>(25)</sup>

As devastating as the effect that age-related macular degeneration has on the quality of vision and quality of life, global public health measures that provide glasses and cataract surgery are by far more successful, safer, and more cost-effective than any therapy previously available for age-related macular degeneration. <sup>(26)</sup>

# Patients and Methods

## **Patients and methods**

### **Study Design**

cross-sectional study.

### **Participants**

The study population was composed of 115 persons, who attend outpatient ophthalmology clinic at Al-Imamin Alkadhimiain (As) teaching hospital complaining from decreased or blurred vision from 5<sup>th</sup> of September 2018 to 14<sup>th</sup> Of October 2018 excluding those who are diagnosed with more than one main cause , both sexes and all age groups were included.

### **Methods**

Participants who reported visual impairment or blindness or had difficulty to focus clearly on close objects, underwent ophthalmic examinations, which included measurements of visual acuity which was assessed with a Snellen E chart. ocular refraction, visual fields, and intraocular pressure; slit lamp examination; and direct and indirect ophthalmoscopy nearly most of them underwent such approach , further investigations were determined on case- by case basis , and all patient were asked to response to questionnaire concerning their ophthalmologic history with some other related questions regarding their medical history.

# Ophthalmology research questionnaire

Case number :

<b>Patient name</b>	
<b>Age</b>	
<b>Gender</b>	
<b>Lived in</b>	
<b>Patient complain and duration</b>	
<b>Is there any pain ?</b>	
<b>Does the eye become red ?</b>	
<b>Is it unilateral or bilateral ?</b>	
<b>Does the patient wear glasses ? for how long ?</b>	

<b>Does the patient have diabetes ? for how long ? and what is the treatment ?</b>	
<b>Does the patient have hypertension ? for how long ? and what is the treatment ?</b>	
<b>Any other chronic illness?</b>	
<b>does the patient have any previous eye surgery / interventions ?</b>	
<b>What is the proper diagnosis?</b>	
<b>What is the visual acuity ?</b>	



# Results:

## Results:

Table 1: illustrates the demographic and clinical characteristics of the study group.

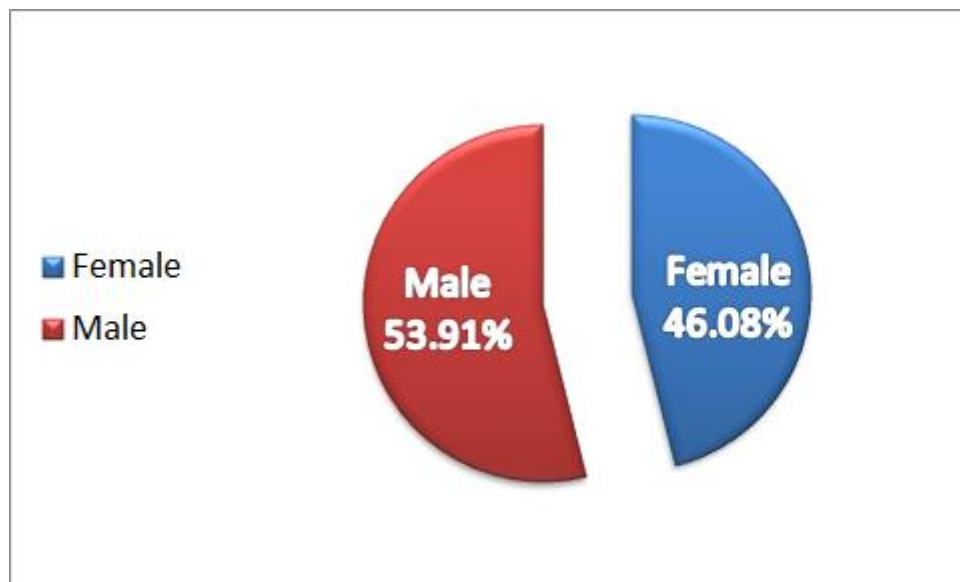
<b>Total sample size</b>	<b>115 patients</b>	
<b>Gender</b>	<b>Male = 62 ( 53.91 % ) Female = 53 (46.08% )</b>	
<b>Diabetic patients 38 (33.04 % )</b>		
	<b>On oral medication = 23 (60.52 %) On insulin = 13 (34.21 % ) No treatment = 2 (5.26 % )</b>	
<b>Painful or red</b>		
	<b>Pain = 11 (9.56%)</b>	<b>Red = 8 (6.95 %)</b>
<b>Mean duration</b>	<b>= 2.74347 years</b>	

Table 2 : illustrate the visual impairment severity

<b>Visual impairment *</b>		
<b>Mild = 57 (49.56%) Moderate = 21 (18.26%) Severe = 37 (32.17%)</b>		
<b>Corrected with glasses</b>		
<b>Mild = 84 (73.07%) Moderate = 4 (3.47%) Severe = 27 (23.47%)</b>		

\* depending on vision impairment classification by The International Classification of Diseases 11 (2018) <sup>(32)</sup> that divided the severity of visual impairment into : mild visual impairment involve those how have visual acuity better than ( 6/24 ) , moderate for those with VA (6/24-6/60) , and severe (6/60 or worse )

115 patients were included in this study, the distribution of patients according to gender where ( 53.91 % ) Male and (46.08% ) Female as shown in figure 1 .



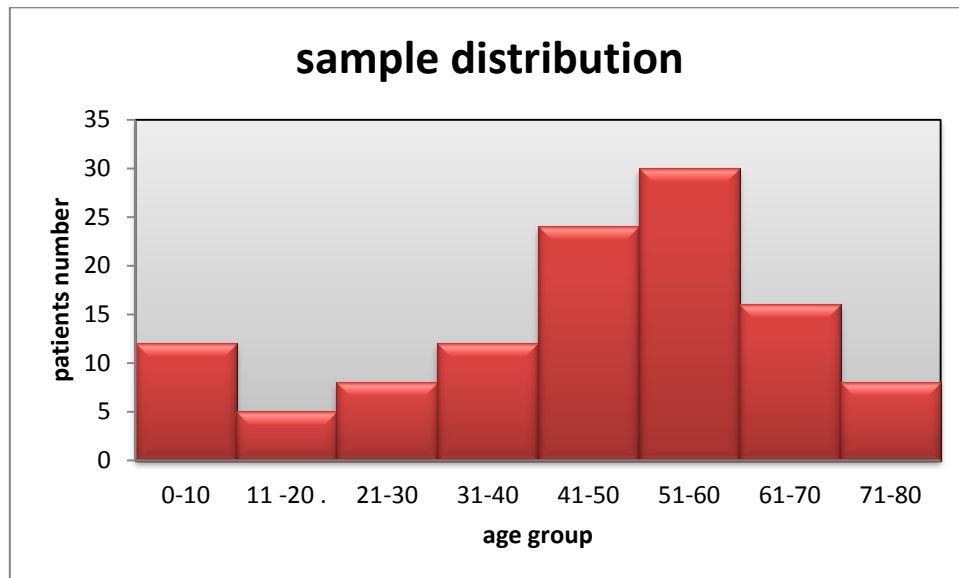
**Figure 1: Distribution of patients according to gender**

Those who have diabetes are 38 patients (33.04 %), and the Mean duration of visual complain for 115 patient was 2.74347 years .

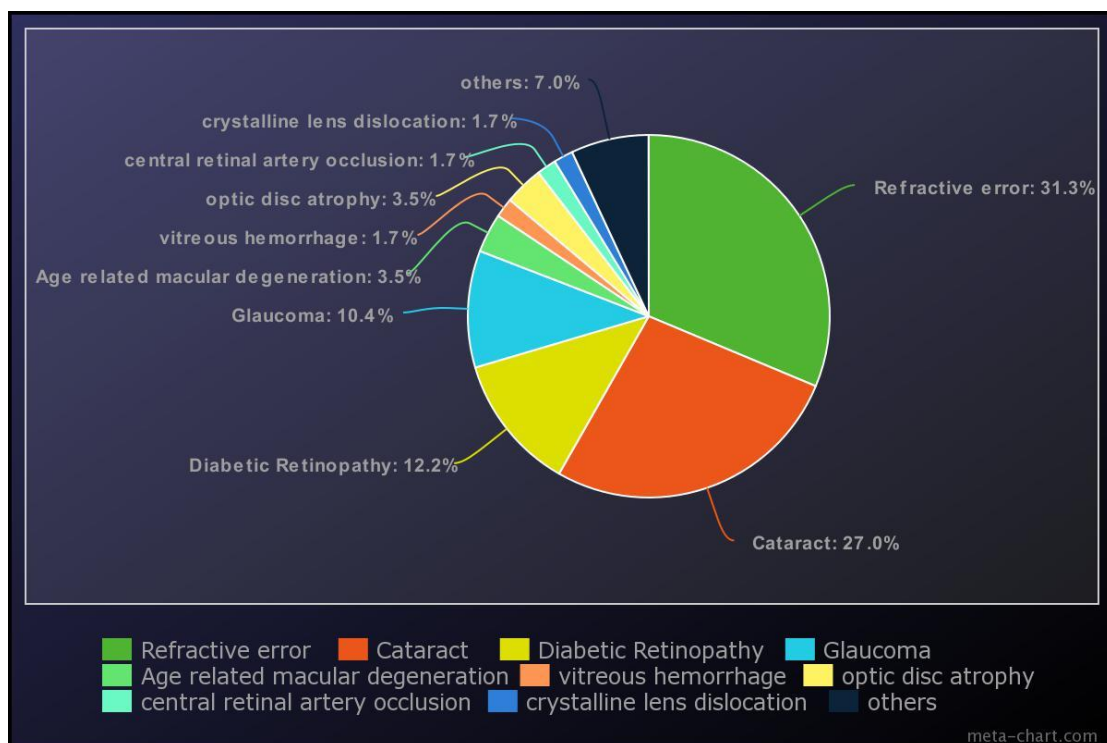
depending on vision impairment classification by The International Classification of Diseases 11 (2018) <sup>(32)</sup> that divided the severity of visual impairment into : mild visual impairment involve those how have visual acuity better than ( 6/24 ) , moderate for those with VA (6/24-6/60) , and severe (6/60 or worse ) , according to this classification about (49.56% ) has mild degree of visual impairment and those with Moderate (19.13%) , while Severe visual impairment account for (32.17%) .

correction by glasses alone the percentage of those who have severe visual impairment decrease to reach (23.47%) , with decrement with those how have moderate visual impairment to reach (3.47%) , Thus, the largest number of patients will remain within mild degree (73.07%) as shown in Table 2.

In Figure 2 which shows the classification of age groups in the study and the distribution of sample size among them.



**Figure 2: distribution of patient by age groups**



**Figure 3: etiology of visual deterioration**

Refractive errors contribute to (31.3 %) of visual impairment which show in the figure 3. thus it is the major cause of vision impairment.

For those with refractive error (42%) have mild impairment , (30%) and (28%) have moderate and severe impairment respectively , which reach (94%) within mild degree of impairment by using glasses only , as shown in Figure 4 and 5.

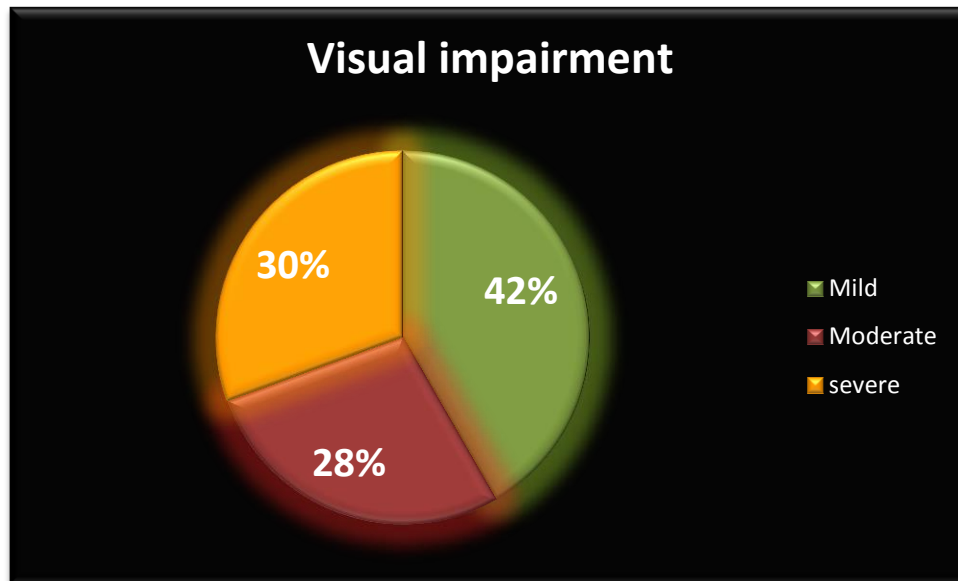


Figure 4 : visual impairment severity for patients with refractive error

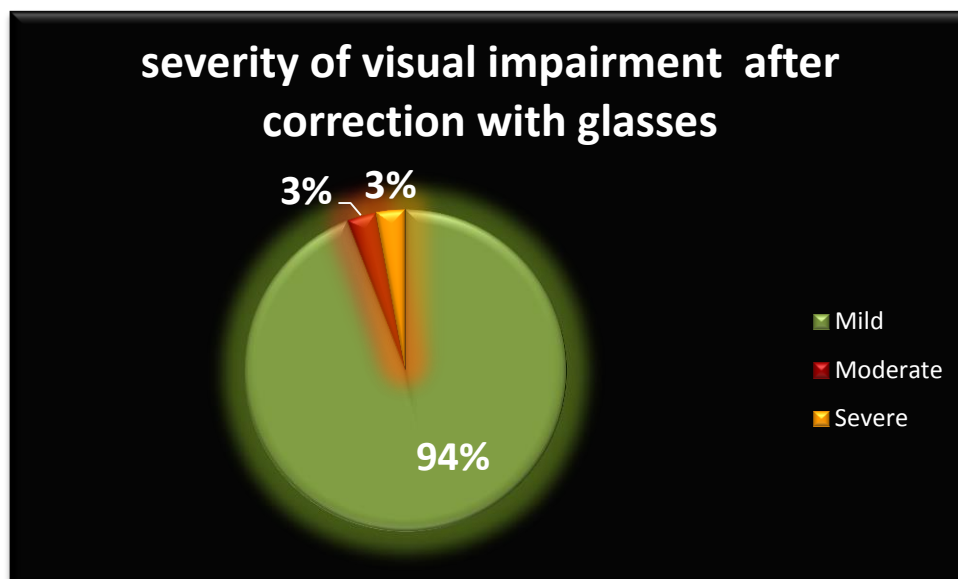
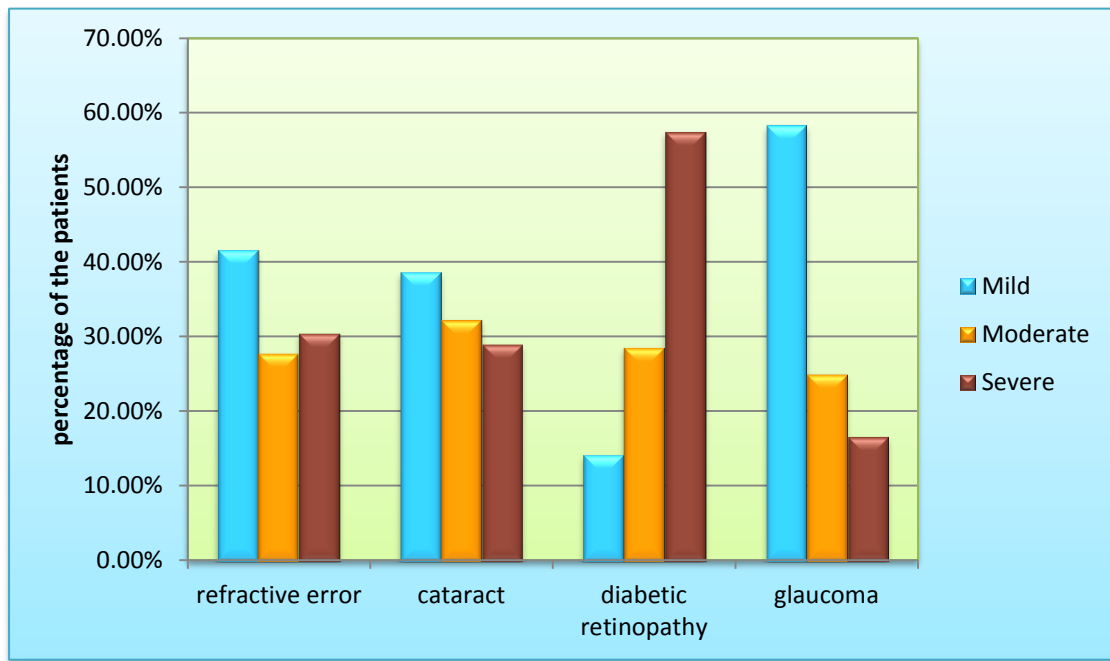


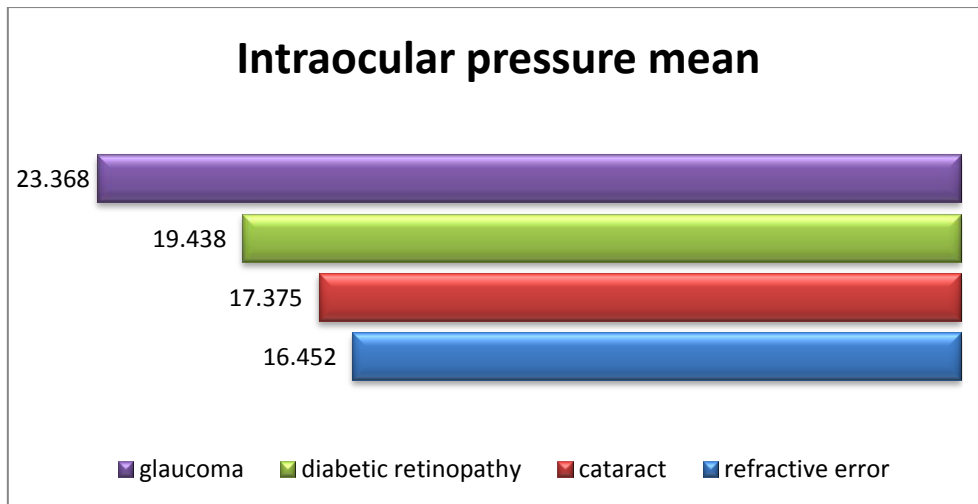
Figure 5 : severity of visual impairment for patients with refractive error after glasses correction

cataract (26.95%) being the second most common cause for visual impairment, leading to severe impairment to (29.03%) for those with cataract as shown in figure 6 .



**Figure 6 : vision impairment severity for each cause**

diabetic retinopathy (12.17%) take the third place followed by glaucoma (10.43%). Other causes were age related macular degeneration (3.4%), optic disc atrophy (3.4%) , central retinal artery occlusion (1.73%) , crystalline lens dislocation (1.73%) , vitreous hemorrhage (1.73%) and others (6.95%).



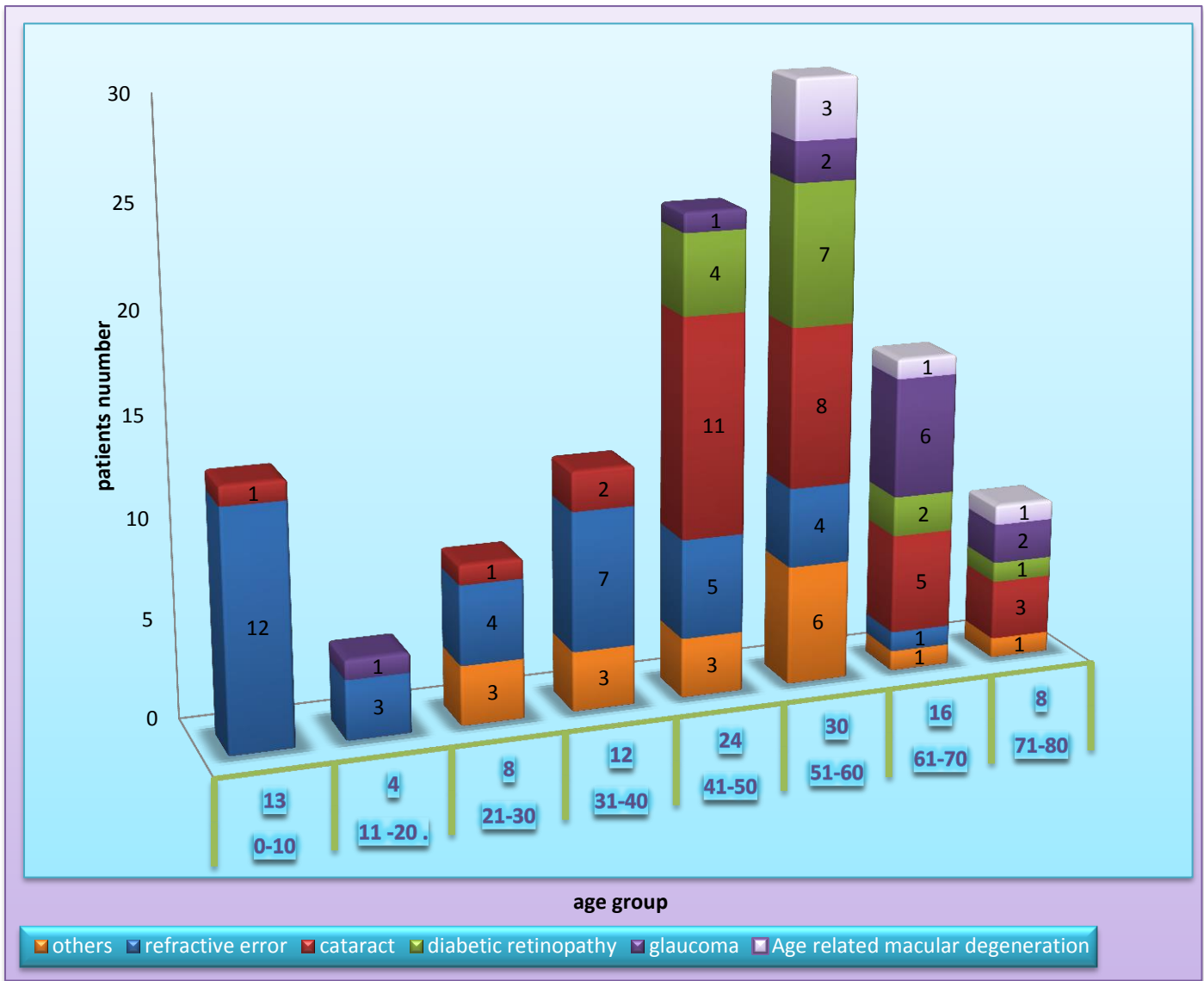
**Figure 7 : intraocular pressure mean for each cause**

We tried to classify the patients into groups so that we can identify the relevant data firstly as shown in Figure 8 to show the distribution of causes on different age groups

to permit maximum integration of data and facilitate comparability patient were further classified as a young , middle , and old age groups

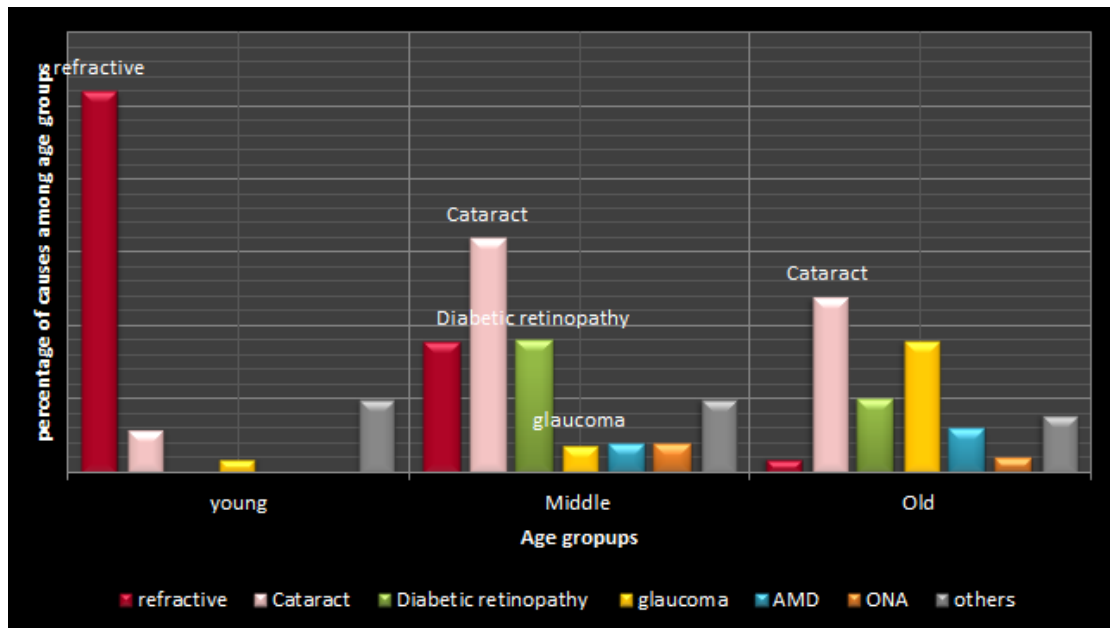
The is depend on that young adults ( ages less than 40 years) <sup>(33)</sup> regarding to this (30.43%) (35 cases ) were young age ,

middle-aged adults (ages 40-60) years, (39.13%) (45 cases ), and older adults (aged older than 60 years), (30.43%) ( 35 cases ). <sup>(33)</sup> as shown in Figure 9



**Figure 8: distribution of visual impairment causes on different age groups**





**Figure 9: distribution of visual impairment causes among young, middle and old age groups**

As shown in Figure 9, refractive error being the most common cause in **young** adults (74.28%) , followed by cataract (8.33%), while in **middle** age group cataract is the most common cause of visual impairment in this age group which is about (35.55%) , followed by diabetic retinopathy and refractive error which are contribute to (20%) for each .

In **old** age group cataract is the most common cause (34.28%) , followed by glaucoma (25.71%) , diabetic retinopathy (14.28%) , age related macular degeneration (8.57%).

# Discussion:

## Discussion:

globally , uncorrected refractive error is the most common cause of visual impairment followed by cataract , <sup>(27)</sup> by studying 115 patient whose main complain decreased vision , the result found to be similar to those worldwide results. <sup>(24)</sup>

when we further discussed it regarding to specific age groups , this study shows that refractive error is the most common in young age , the percentage of young patients having refractive error was (74.28%) as compared to the study conducted by Mingguang He <sup>(28)</sup> in which it was (95.6%).

The incidence of cataract is shown to increase with age, the increment being more prominent in old age patients and as it being the most common cause account (34.28%) , followed by glaucoma (25.71%) consistent with the result obtained by Laitinen A and Laatikainen L. <sup>(29)</sup>

The National Eye Institute reports that diabetic retinopathy the most common cause of vision loss among people with diabetes and the leading cause of vision impairment and blindness among working-age adults. <sup>(30)</sup> in our study , the diabetic retinopathy was highest in the middle age group. about (64.28%) cases who have DR were in the middle age group , although it is not the commonest cause for vision impairment for this age group account for 20 % from them which is the same as refractive error , and only preceded by cataract (35.55%) .

the age specific cause which has a wide varieties between different region , in our study it found to be different from studies in developed countries especially for old age group.

as age related macular degeneration account for only about ( 8.57%) from old age group. And it is account (3.5%) from the total sample, found in middle and old age group and only

cataract (34.28% ), glaucoma (25.71%) , diabetic retinopathy (14.285) , were much more common for old age group , in this point there is a difference from developed countries study as United States where AMD is The leading cause of visual loss among elderly persons as stated in the United States National Eye Institute national plan for eye and vision research, with Prospects AMD will become a more prevalent cause of blindness than both DR and glaucoma combined . <sup>(20), (23)</sup>

Glaucoma is found to be the second most common cause of visual impairment for old age group (25.71%), while it account only (4.44%) , and (2.85%) for middle and young age group respectively . the result was within the suspected as the prevalence increases in older age groups. Persons ages 70 and older are at 3- to 8-fold greater risk of having primary open-angle glaucoma compared to persons in their 40s. <sup>(31)</sup>

However, small sample size in our study in compare to the very wide diversity of visual impairment causes is one of the limitation potential limitations.

### **Conclusion :**

In conclusion , uncorrected refractive error is a major cause of vision impairment . cataract, diabetes mellitus, and glaucoma are another main causes and the causes of visual impairment varies considerably among different age groups.

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