



Fundoscopic changes of High myopia in relation to axial length in randomly selected patients attending Aso-Eye hospital

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Abstract

Definition: Degenerative myopia is the seventh leading cause of legal blindness. Degenerative myopia is more severe than other forms of myopia and its associated with retinal changes, potentially causing severe visual loss. Occurred in about (30%) of myopic people.

Purpose : The purpose of this study is to determine fundus changes that occurs in relation to change (increase) in axial length of eye in patients attending Aso- Eye hospital .

Method : A samples of fifty patients (100) eyes from 1/1/2010-1/12/2010 by cross sectional study, 19 (38eyes) of cases were males and 31(62eyes) were females for all age groups, most of them between 20 and 40 years old.

Results :The most common fundus changes related to increase in the axial length of the eye were optic nerve crescent, posterior staphyloma, chorioretinal atrophy, and lacquer cracks, Retinal detachment occurred in only one eye.

Among the studied socio-demographic variable we found that from Sulaimania center about (18) cases and from outside center(32).

Conclusion : We concluded that most patient were females between (20-40) years old and third of them with positive family history most of them used glasses for correction of refractive errors, nearly halve of them had regular follow up, most patient were from outside center. All changes mentioned directly related to the axial length increment but lattice degenerations, and the less common Fuch's spots they were not related directly.

Keywords: Degenerative myopia, axial length of the eye, Fuch's spots.

Introduction

Myopia is a condition whereby images come into focus in front of the eye, resulting in a blurred image on the retina. The more severe the nearsightedness, the farther the image is from the retina, which results in more blurry vision in the distance. ^[7]

There are three ways for an eye to become myopic:

- The front surface of the eye (the cornea) is too curved and, therefore, too powerful or increase in refractive index of the lens.
- The eyeball itself is too long.
- A combination of both of the above.

In many cases, myopia will stabilize when the growth process has been completed, and glasses can offer

normal vision. Higher levels of myopia, however heredity is believed to play a role in myopia.

In the more severe chronic cases degenerative or pathological myopia), there is the possibility of sight loss. The deformation of the eye creates stress on the retina, which can become damaged, detached, this can then provoke additional changes like macular problems. Not to be confused with macular degeneration related to age.^[11]

For the purposes of this dissertation, degenerative myopia is described here.

The symptoms of myopia are blurred distance vision, eye discomfort, squinting, and eye strain.^[9]

Patients with (degenerative myopia) typically complain of decreased vision, headaches, and photophobia. And the most common cause of visual loss is maculopathy. Patients may also report light flashes and floaters, which are associated with retinal changes.

Diagnosis

The diagnosis of myopia is typically made during the first several years of elementary school when a teacher notices a child having difficulty seeing the chalkboard, reading, or concentrating.^[6]

Treatment

Eyeglasses, Contact Lenses, Refractive Eye Surgery and Two treatments for prevention of degenerative myopia one is the scleral buckling, the other is early systemic treatment (7-methylxanthine), which has been shown to normalize the abnormal growth pattern of myopic eyes in children aged 8-13.^[15]

Systemic associations

Ehlers-Danlos, Marfan, Down, and Stickler syndromes.^[8]

Ocular associations

Cataract (posterior subcapsular and nuclear sclerosis), POAG, ROP and Amblyopia.^[8]

Classification

- **By cause**
Axial myopia, Curvature myopia and Index myopia.^[1]

- **Clinical entity**

Simple myopia.

Degenerative myopia, also known as malignant, pathological, or progressive myopia. Individuals with high myopia, can develop pathological changes in the retina, called degenerative myopia.

Nocturnal myopia, Induced myopia, also known as acquired myopia.

Form deprivation myopia

Near work Induced Transient Myopia (NITM), is defined as short-term myopic far point shift immediately following a sustained near visual task. Some authors argue for a link between NITM and the development of permanent myopia.

- **Degree:**

Low myopia; of -3.00 diopters or less

Medium myopia; between -3.00 and -6.00 diopters.

High myopia; of -6.00 or more.^[11]

- **Age of onset:**

Congenital myopia, also known as infantile myopia,

Youth onset myopia occurs prior to age 20.

School myopia

Adult onset myopia

Early adult onset myopia occurs between ages 20 and 40.

Late adult onset myopia occurs after age 40.^[20]

Etiology

Combination of genetic^[3] and environmental^[6] factors.

Degenerative myopia progresses rapidly, and visual outcome depends largely on the extent of fundus and lenticular changes. The diagnosis of degenerative myopia is accompanied by characteristic chorioretinal degenerations, and macular changes.^[15]

Most typical features of degenerative myopia are:

Focal chorioretinal atrophy; characterized by visibility of larger choroidal vessels and eventually sclera.

Pale tessellate (tigroid) appearance due to diffuse attenuation of RPE with visibility of larger choroidal vessels.

Vitreous liquefaction and posterior vitreous detachment

Optic disc crescent This is an early change in the myopic fundus and is due to a pulling away of the choroid and retinal pigment epithelium, usually from the temporal edge of the optic nerve to expose the sclera. ^{[18] [21]}

Lattice degeneration: affects approximately (8%) is a common, atrophic disease of the peripheral retina characterized by oval or linear patches of retinal thinning. The prevalence peaks by second decade and it is believed to be minimally progressive but retinal detachment may be the complication. ^[13]

Tilting or malinsertion of optic disc, usually associated with myopic conus. ^[22]

Thinning of the retinal pigment epithelium : with resulting atrophic appearance of the fundus may be the result of stretching and thinning of the retinal pigment epithelium and choroid as the eye enlarges, thus exposing the sclera.

Posterior staphyloma : Ectasia of the sclera posteriorly at the posterior pole can affect the vision and lead to neovascularizations of choroid. Even after the eyeball has fully grown (by adulthood), weakness in the sclera can lead to development of a posterior staphyloma. ^[14]

Lacquer cracks :

Breaks in Bruch's membrane and choriocapillaris, consist of ruptures in RBE - Bruch's membrane - choriocapillary complex appear as irregular, yellow lines, often branching and criss crossing at posterior pole. Blood vessels may protrude through the cracks and leak into the subretinal space beneath the photoreceptor cells, known as "choroidal neovascularization," this hemorrhaging can lead to scarring, retinal separation, and profound sight loss in the central field. ^{[15] [8]}

Fuch's spot in the macular area:

Which is a raised circular pigmented lesion that may develop after macular haemorrhage has absorbed. ^[2] Myopic degeneration is similar to age – related

macular degeneration (AMD) in that it causes loss of central vision. This is caused by separation of the retina as a result of abnormal elongation of the eyeball. ^[21]

Objective

To determine the fundus changes in relation to increase of axial length in high myopic patients. And to evaluate the most common complications that occurred to those patients.

Patients and Methods

2:1 Setting of the study:

The study was carried out in Sulaimania governorate in Aso eye hospital.

2:2 Study design:

Cross sectional study with analytic component carried out on Sulaimania governorate

2:3 Materials of the study:

1. Patients with high myopia were selected for the study of refractive errors 6 diopter and more and axial length of 26 mm and more.
2. Snellen's test –chart was utilized for examining the visual acuity.
3. Slit-lamp was used for anterior segment examination with biconvex lens +78,+90 was used for examining the fundus.
4. Tropicamide eye drops for pupil dilation.
5. Goldmann 3mirror used to examine all fundus
6. Questionnaire for data collection (including history and ophthalmic examination) was adopted any complications detected were recorded.
7. A-scan for axial length measurement.
8. B-scan for detection of posterior staphyloma.

2:4 Patients:

The total number of the patients were involved in this study in Sulaimania governorate 50 case (100 eyes) were divided into three age group <20 years and 20-40 years, also divided axial length of eyes into eight axial length groups starting from 26-27.5 mm, to 33.5mm, by 1mm, apart.

2:5 Criteria for selection of the sample:

Data was collected by a questionnaire (attached) adopted for this purpose and all patients having high myopia and axial length 26mm and more and degree of six diopters and more were included in the study.

2:6 Statistical analysis:

Analysis of the study result accomplished by the following methods:

1. Questionnaires were collected, tabulated, and presented in a descriptive form, and the collected data

was put down on A4 paper first, then transferred to computer on SPSS manager system NO.13.

2. Counts and percentage were used in the calculation and description of the sample.

3. Statistical analysis was done by using SPSS 13 pack for windows and Chi-square test(X^2 -test) used for comparing groups.

Results

This study was conducted to determine Fundoscopic changes of High myopia attending Aso-Eye hospital from 1/1/2010-1/12/2010 by cross sectional study we found sex distribution were as follow(38%)were males and (62%)were females as shown in figure(1).

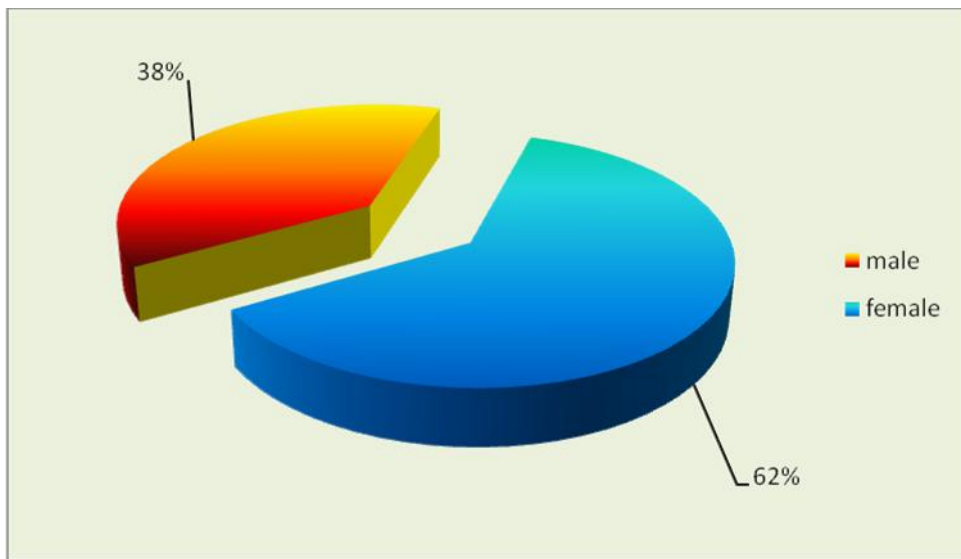


Figure (1) Shows Sex distributions of myopic patients

Age distributions as shown in figure (2) in this study were in three groups first one (<20year)

second group (20-40year) third one (>40year) with predominance for second age group

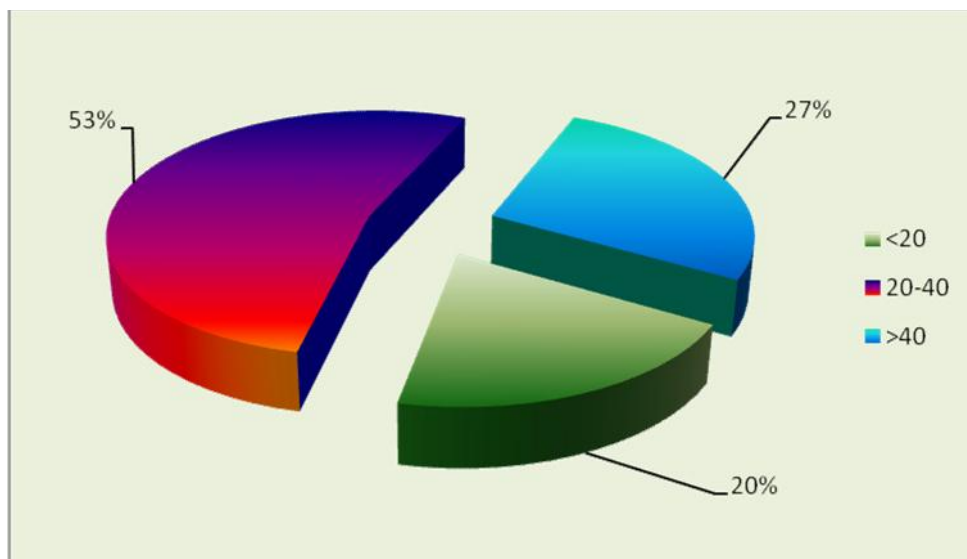


Figure (2) shows Age groups distributions of myopic patients

Family history in this study divided as patients with positive (+FH) (36%) and negative (-FH) family history were in(64%) as in figure (3).

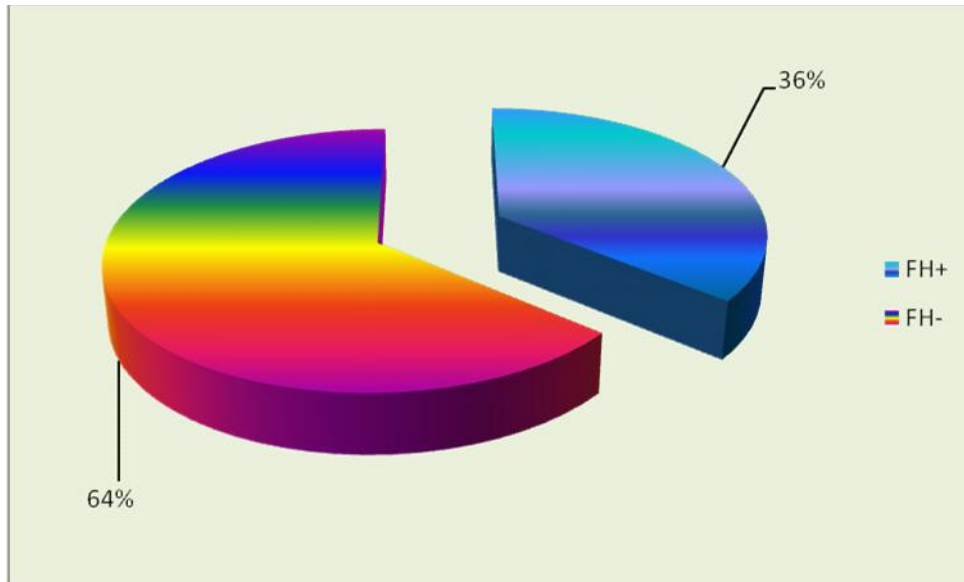


Figure (3)shows Family history distributions of myopic patients

For history of checking or follow up show (visit regularity) divided as regular (48%) and visit(52%) figure (4).

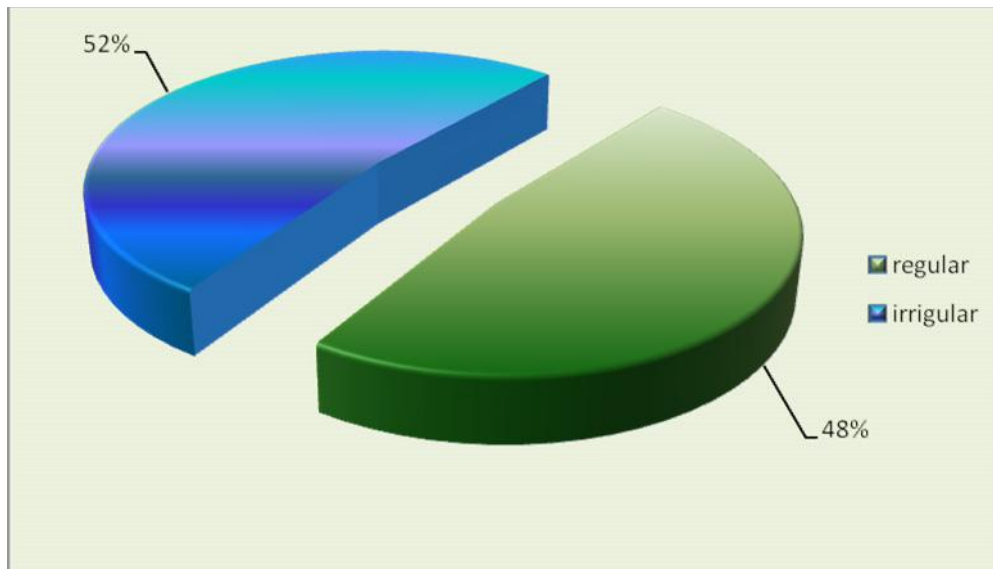


Figure (4)shows Visit regularity of myopic patients

For types of correction of refraction errors, myopic patients in figure(5)by glasses (74%) ,contact lenses

(2%) , both glass and contact lens(14%)and none don't uses any method are (10%).

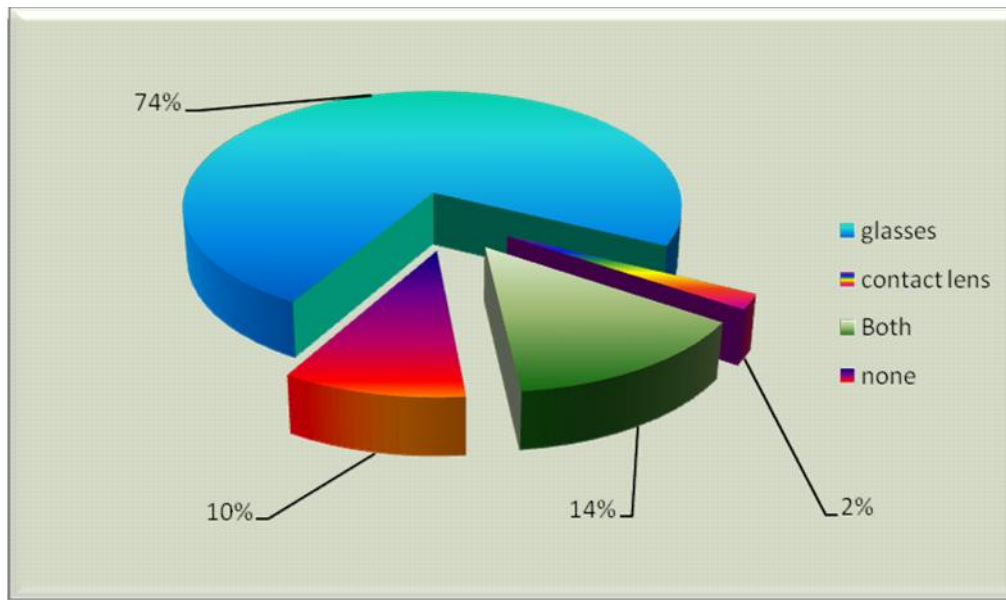


Figure (5)shows method for correction of refraction errors

Optic nerve crescent table(1) occurred in (98%) eyes, and at all eyes of axial length of (28.5) mm and more.

Table (1) shows optic nerve crescent at each axial length

Axial length in mm	Crescent (+ve)	Crescent (-ve)	Total
26-27.4	20	1	21
27.5-28.4	26	1	27
28.5-29.4	20	0	20
29.5-30.4	18	0	18
30.5-31.4	8	0	8
31.5-32.4	4	0	4
32.5-33.5	1	0	1
>33.5	1	0	1
Total	98	2	100

Posterior staphyloma from table (2) occurred in about (47%) of eyes, with more frequency at(28.5 - 29.4)and above.

Table (2) shows Posterior staphyloma at each axial length group

Axial length in mm	Staphyloma(+ve)	staphyloma (-ve)	Total
26-27.4	4	17	21
27.5-28.4	8	19	27
28.5-29.4	11	9	20
29.5-30.4	15	3	18
30.5-31.4	6	2	8
31.5-32.4	2	2	4
32.5-33.5	1	0	1
>33.5	0	1	1
Total	47	53	100

Chorioretinal atrophy from table (3) seen in (38%)eyes.

Table (3) shows chorioretinal atrophy at each axial length group

Axial length in mm	Atrophy (+ve)	Atrophy (-ve)	Total
26-27.4	4	17	21
27.5-28.4	8	19	27
28.5-29.4	7	13	20
29.5-30.4	10	8	18
30.5-31.4	5	3	8
31.5-32.4	3	1	4
32.5-33.5	1	0	1
>33.5	1	0	1
Total	38	62	100

Lacquer cracks were present in (13%) from eyes examined from table (4) more frequent at(30.5-31.4)mm axial length group.

Table (4) shows lacquer cracks at each axial length group

Axial length in mm	Lacquer(+ve)	Lacquer(-ve)	Total
26-27.4	0	21	21
27.5-28.4	2	25	27
28.5-29.4	3	17	20
29.5-30.4	5	13	18
30.5-31.4	2	6	8
31.5-32.4	1	3	4
32.5-33.5	0	1	1
>33.5	0	1	1
Total	13	87	100

Fuch's spot from **table (5)** that occurred in(5%) were in two eyes from twenty eyes at third axial length

group and in next three axial length groups there is only one eyes for each group.

Table(5) shows Fuch's spot at each axial length group

Axial length in mm	Fuch's spots +	Fuch's spot -	Total
26-27.4	0	21	21
27.5-28.4	0	27	27
28.5-29.4	2	18	20
29.5-30.4	1	17	18
30.5-31.4	1	7	8
31.5-32.4	1	3	4
32.5-33.5	0	1	1
>33.5	0	1	1
Total	5	95	100

Lattice degeneration from **table (6)** occurred in (22%)of eyes .

Table (6) lattice degeneration at each axial length group

Axial length in mm	Lattice (+ve)	Lattice(-ve)	Total
26-27.4	1	20	21
27.5-28.4	7	20	27
28.5-29.4	5	15	20
29.5-30.4	3	15	18
30.5-31.4	3	5	8
31.5-32.4	2	2	4
32.5-33.5	0	1	1
>33.5	1	0	1
Total	22	78	100

Retial detachment occurred in one eye only of axial length group of >33mm.

Discussion

Based on result obtained in this study we found that both sexes not equaled, were percentage of females (62%) compared with (38%) males so this go with most of other study that show imbalance in sexual distribution which stated that myopia is slightly more prevalent among females than males. Overall (20%)

of those living in the United States are myopic. Myopia is slightly more prevalent among females than males, and among those with advanced academic training. In Asian countries; as much as 70 % of the Chinese population is nearsighted. High myopia affects 27% to 33% of all myopic eyes, corresponding to a prevalence of 1.7% to 2% in the general population of the United States. (Cline, D; Hofstetter HW; Griffin JR (1997), Fredrick DR (May 2002). "Myopia").

Regarding age distributions we found that changes of fundus most common at second age group (20-40) year about (53%) compared with third age group (>40) years about (27%) while in first group (<20) years about (20%), this explained that increase of axial length of eyes as person age advanced also this go with other studies that yields predominance at this age group (Sperduto RD, Seigel D, Roberts J, Rowland M. (1983) Prevalence of myopia in the United States).

Patients with positive Family history were (36%) compared with (64%) show negative family history, this is not go with other studies which show genetics play important role in myopia especially In Asian ethnic race. (Hammond CJ, Andrew T, Mak YT, Spector TD (August 2004). And in other study if both parents are myopic, then the odds that the child will be myopic are as high as (60%). This drops to at most (40%) when only one parent is nearsighted, and for (15%) of myopic children, neither parent has myopia. High myopia is especially likely to have a genetic component. (Curtin, Brian J)

Where (52%) had irregular visit for checking and follow up in opposite to (48%) with regular visit. This may explain an education of patients about their symptoms as they had some what good near vision.

For method of correction or treatment for myopia we found that most of patients used eye glasses for correction of refractive errors that happened (74%) and this the most common and suitable for most patients compared with (2%) use contact lenses which show less value may be due to their method of disinfection, complication, or even manipulations and about (14%) uses both glasses and contact lenses, the remain who didn't use any method for corrections were (10%), which may be not enough to correct refractive error due to other problem associated with myopia like cataract which need extractions or maculopathy, or satisfaction of patients with near vision so they didn't care with far vision.

The first and most common retinal changes in high myopic persons was optic nerve crescent its occurred in (98%) of eyes and at axial length of (28.5)mm and above occurred in all eyes show optic nerve crescent. Correlation is significant. And this is directly related to increase in length of the eye and this go with other studies result. (Curtin BJ, Karlin DB)

The second most frequent retinal changes was posterior staphyloma which occurred in about (47%) of eyes, we found that gradual increase in frequency as axial length increased to be seen in all patients at (32.5-33.5) mm axial length and more. Correlation was significant. This is directly related to increase in length of eye so this go with other studies. (Hoffman DG) (Joseph W. Sowka, OD, FAAO).

Chorioretinal atrophy which is third most frequent in this study seen in about (38%) eyes, we found that gradual increase in frequency as axial length increased, continue to be in all eyes of (32.5)mm and more. Correlation is significant at 0.05 level. This is directly related to increase in length of eye so this go with other studies. (Curtin BJ, Karlin DB).

Lacquer cracks occurred in less frequency than above changes, from eyes examined in this study showed gradual increase parallel to increase to axial length of the eye and related directly to it. Correlation is significant at 0.05 level while other studies showing that lacquer crack related in directly with axial length. (Curtin BJ, Karlin DB).

Fuch's spot occurred there was two eyes from twenty at third axial length group (28.5-29.4) mm and only one eyes for next two groups. Correlation was significant at the (0.05). But not related directly to increase in axial length, and this go with other studies observed in (5-10%) of eyes with axial length 26.5mm. (Curtin BJ, Karlin DB).

Lattice degeneration which is occurred in about (22%) of eyes Its occurrences is not directly related increase to length of eyes, also seen to be occurred more frequently (22%) than other studies, as it occurred in (10%) of populations of united state. (David Sarraf, MD) (Celorio JM, Pruett RC)

Among the studied socio-demographic variable has been found that from Sulaimania center about (36%) cases and from outside center and governorate (64%).

Retinal detachment was present in only one eye, of patient had all fundoscopic features of high myopia in other eye, he received laser for sound eye prophylactically, he had family history of myopia, on his family member had lost his vision from bilateral total retinal detachment. Other studies show Retinal detachment is more common in those with severe myopia (above 5-6 diopters), as their eyes are longer and the retina is stretched. Myopia is associated with

67% of retinal detachment cases. Patients suffering from a detachment related to myopia tend to be younger than non-myopic detachment patients. (georgy luke larkin).

Conclusion and Recommendations

Conclusion

We concluded that most of the patients were females aged between (20-40) years old and third of them with positive family history most of them used glasses for correction of refractive error, nearly halve of them had regular follow up.

The most common fundus changes related to increase in the axial length of the eye optic nerve crescent, then posterior staphyloma, chorioretinal atrophy, and lacquer crack, all directly related to axial length increment but lattice degenerations, and the less common Fuchs spots that not related directly.

Retinal detachment occurred in only one eye.

2:6-Limits of the study:

1. The research is relatively new in sulaimania governorate
2. Deficient in cases as many of them visit clinics.
3. Many of patients from area away from the centre.
4. Some of patients had anterior segment problems like cataract render exam of fundus difficult.

Recommendations

-To the researchers: To take more period and more number of patients also to seek for myopia in other place such as schools, universities, primary health centers so to enlarge the sample and make it more representative of the community

2-To the ministry of education: To cooperate with ministry of health and with media to publish the problem and make more clear and easy to general people and to explain to give up about ignorance of this blindness leading condition .

3-To the parents and teachers: To give more attention to their kids and careful about any defect in vision for far vision and to teachers in class room, then it may be possible to prevent or control myopia also maintaining good nutrition and limiting married between relative who had history of myopia

3-To myopic patients: Everyone should have regular eye exams to see if the prescription has changed or if any other problems had been developed like floaters and photopsia . And advise them to use sufficient light for reading, close work, and by wearing corrective lenses as prescribed. This is particularly important for people with high (degenerative) myopia who may be at a greater risk of developing retinal detachments or other problems.

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بسم الله الرحمن الرحيم

ملخص الأطروحة باللغة العربية

قصر البصر المرضي أو العالي يعتبر احد الأسباب المهمة والرئيسية حيث يحتل المرتبة السابعة لفقدان البصر الشديد، ويشكل هذا النوع أكثر خطورة من بقية أنواع قصر البصر. التي تحصل في قاع العين (شبيكية العين) الى مستشفى أسولأمراض العيون وممن يعانون من قصر البصر العالي () بدراسة مقطعية للفترة من 1-1-2010 إلى 1-12-2010 كان عدد المرضى خمسون مريض (مائة عين) د النساء كان واحدا وثلاثين مريضا وعدد الذكور تسعة عشر من فئات عمرية مختلفة، وكان أغلبهم من الفئة العمرية ما بين العشرون والأربعون سنة معظمهم من خارج مركز مدينة السليمانية. ومن خلال الفحص تبين وجود تغيرات في شبكية العين ترافق زيادة طول العين. العين يؤثر سلبا عليها مؤديا الى زيادة التغيرات وبالتالي فقدان البصر بصورة تدريجية و فقدان بصر شديد في حال حدوث مضاعفات أخرى الشبكية.

APPENDICES

Questionnaire

Name : Age: Sex: Occupation:

Residence FH : 1st time dx of myopia: Glass: CL:

Hx of change glasses: Every:

Degree of myopia(D) : R: Ass.

Astigmatism: L:

VA:

Un aided: R: L: PH: R L

aided: R: L:

U/S:

Axial L: *R* *R*
L *L*

Funds changes:

	R		L
① Optic n. crescent	<input type="text"/>		<input type="text"/>
② Chorioretinal atrophy	<input type="text"/>		<input type="text"/>
③ Geographical atrophy	<input type="text"/>		<input type="text"/>
④ Lattice degeneration	<input type="text"/>		<input type="text"/>
⑤ Fuchs spots	<input type="text"/>		<input type="text"/>
⑥ Lacquer cracks	<input type="text"/>		<input type="text"/>

7 Coin haemorrhage	<input type="text"/>	<input type="text"/>
8 Posterior staphyloma	<input type="text"/>	<input type="text"/>
9 Retinal detachment	<input type="text"/>	<input type="text"/>
10 Pigmentary degenerations	<input type="text"/>	<input type="text"/>
10 Other	<input type="text"/>	<input type="text"/>

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