Original Research Paper

Volume - 12 | Issue - 03 | March - 2022 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Ophthalmology

"A CLINICAL ANALYSIS OF 50 CASES OF PATHOLOGICAL MYOPIA"

Dr. R. Uma Maheshwari M.S., Chief Civil Surgeon, Udumalpet GH.

Dr. S. Nehru* M.S., D.Opthal., Cheif Civil Surgeon, Department of ophthalmology, Govt Kallaikurichi Medical College Hospital. Kallaikurichi. *Corresponding Author

ABSTRACT **Aim Of Study:** To analyze the clinical features and biometric parameters visual parameters in relation to posterior polar changes and disc changes, the incidence of retinal degenerations and detachment, association of other ocular association like lens changes, open angle glaucoma, retinitis pigmentosa, strabismus in pathological myopia.

Introduction: Eyes with pathologic myopia is more likely due to a disease than to a biologic variation.such eyes show excessive axial length with equatorial scleral expansion ,dehiscences and posterior staphyloma formation.Global expansion can slowly progress during a persons life time and result in blinding complications.

Materials And Methods: This study was carried out at Peripheral District Head Quarters Hospital, kallakurichi, Tamil Nadu State in a period of three years (March 2016 - February 2019. This is a prospective study. Cases were registered, evaluated, treated and followed up during the study period.

Results: 96 eyes of 50 patients with pathological myopia were analysed.. 8% had unilateral myopiawith the age group between 21 – 30 yrs,70% of the patients had an UCVA ranging between 2/60-6/60. More than 50% of the cases showed vitreous abnormalities wth temporal crescent and tessellated fundus as a common feature. Posterior staphyloma was seen in 10% eyes

Conclusion: Pathological myopia is a complex eye disease with degenerative changes are more commonly seen in higher degrees of myopia examined meticulously with indirect ophthalmoscope which can pick up complications at the earliest & can be treated effectively

KEYWORDS : Pathological myopia

INTRODUCTION:

Eyes with pathologic myopia are an eccentric group in which the myopia is more likely due to a disease than to a biologic variation.such eyes show excessive axial length with equatorial scleral expansion ,dehiscences and posterior staphyloma formation.Global expansion can slowly progress during a persons life time and result in blinding complications. Pathologically myopic eyes have erros of -6.00 D or greater,in excess of -40.00 D. With recent technologies like Bscan, ICG,FFA and OCT we are able to understand and monitor the underlying pathology and structural alterations in a better manner.

Prevalence Of Myopia

Prevalance of myopia varies with age, sex and other factors.Most infants reach emmetropia by 2 -3 years of age. Prevalance of myopia increase in school age and young adults reaching 20% – 25 % in mid to late teenage population and 25% – 35 % in young adults. Studies have found a slightly higher prevalence of myopia in females than in males. The prevalence of myopia increases with income level and educational attainment and it is higher among persons who work in occupation requiring great deal of near work. Among children in India, Shulka found myopia to increases from below 5% at 5 years to 20% at 20 years. Mc laren compared 2 groups of Indian children in which one group who had nutritional supplement showed better general development, also had a slightly higher prevalence of myopia . In an older population, Banerjee found35% of a college student group in Calcutta to be myopic. In India, Blan observed that 42% of people above the age group of 25 years exhibited either myopia or myopic astigmatism.In Goldschmidt's study the prevalence of myopia among girls was significantly greater than that among boys. According to APEDS study an estimated 30 million population would have myopia,15.2 million would have hyperopia in population of more than 15 years of age.

Myopia

Myopia is that form of refractive error wherein parallel rays of light come to a focus in front of the sentinent layer of the retina when the eye is at rest.

Classification Of Myopia

Etiological Classification :

Axial Myopia

Index Myopia .

Clinical Classification:

Intermediate Myopia:

Here there is increased expansion of posterior segment of globe. Myopia upto -8.0 dioptres associated with various fundus changes can be considered intermediate.

Pathological Myopia:

Also called as malignant myopia. Determined by hereditary and postnatal factors. There is excessive axial elongation of the eye and a number of ocular complications. Myopia of -6.0 dioptres or more is considered pathologic.

Pathogenesis

Pathologic myopia is characterized by degenerative changes occurring particularly in the posterior segment of a highly myopic eye, often associated with lengthening of the anteroposterior axis of the globe. The most common form of pathologic myopia is the isolated developmental form, where as in simple myopia the myopic tendency is restrained after puberty.In developmental pathologic myopia , the near sightedness may increase even more rapidly during adolescence and the axial enlargement may even slowly increase during adulthood into the 40s and 50s , with the eventual genesis of atrophic and degenerative intraocular changes leading to visual loss and possibly blindness. The most common associated fundus conditions resemble partial albinism. Varying degrees of myopia commonly are associated with ROP, microophthalmia, microcornea. microphakia, buphthalmos, the tapetoretinal dystrophies and down syndrome.

Inheritence

Previous reports have identified a locus for autosomal dominant pathologic myopia to gene 18p11.31. More recent findings posit the genetic heterogeneity of myopia by establishing linkage to a second locus at the 12q2123 regions generally are transmitted as a dominant trait . In higher degrees of myopia , which often begin at a relatively early age , recessive transmission is more common.

Ocular Changes In Pathological Myopia:

Clinically, a severe myopic eye generally appears large and prominent. The cornea may be abnormally flat , the anterior chamber is somewhat deeper than normal and the ciliary muscles are atrophic.

Changes In Posterior Segment:

1.**Scleral changes** – posterior enlargement of the globe and thinning of the sclera at the posterior pole with scleral ectasia and posterior staphyloma.

2.Changes in the epipapillary and the peripapillary region– oblique entrance of the optic nerve, tilted disc , myopic crescent , nasal supertraction.

3.**Changes in the choroid and retina**– atrophy and thinning , particularly affecting the posterior pole and the periphery. These changes include atrophy and/or proliferation of the pigment epithelium, formation of the Foster Fuchs spot at the macula, retinal microcystoid degeneration, and occasional peripheral retinal break formation and subsequent detachment.

4. **Degenerative Changes In The Vitreous**.

5. **Degenerations Of The Peripheral Retina**
Retinal hole, Cystoid degeneration, Paving stone degeneration, Chorioretinal degeneration:

Chorio- retinal atrophy, Pigmentary degeneration:

6.Lattice Degeneration:

Complications
1. Rhegmatogenous retinal detachment .
2. Choroidal thromboses and haemorrhages.
3. Cataract
4. severe visual impairment.
5. chronic simple glaucoma.

Clinical Evaluation Of Pathological Myopia
1. **Visual acuity** 2. **Direct ophthalmoscopy** 3. **Indirect ophthalmoscope** 4. **Fundus fluorescein angiography –** Used to detect posterior pole changes like SRNVM, foster fuch's spots, lacquer cracks and early macular hole in cases of pathological myopia. 5**. Indocyanine green angiography –** Is superior to FFA in studying choroidal lesions because of certain physical properties of ICGA dye.Choroidal circulation and areas of neovascularisation lying beneath the retina show much better with **ICGA.** Hyperfluroscence is seen in patients with abnormal vessls or neovascularisationof the choroid and leakage of the disc.Also seen in areas of atrophy of pigment epithelium.

6. **Ascan**. 7 **Bscan** 8 **Optical coherence tomography**

Management
Treatment of pathologic myopia may be divided into 3 goals – visual rehabilitation of the patient, prevention of myopic progression and the management of a variety of complicating diseases.

Visual Rehabilitation
Optical:
Spectacles
Contact lenses
Surgical:
Surgical correction of high myopia can be attempted through ,
1. The flattening of corneal curvature for lower degrees.
2. Insertion of IOL into the phakic anterior chamber.
3. The removal of clear crystalline lens.
4. Shortening of axial diameter by scleral resection.
5. Role of LASIK in high myopia is controversial.

Low vision aids – in cases of high myopia, the most useful low vision aid for distance is use of telescopic lens. New models with a small telescopic lens fitted into patients spectacles may be of great use.

Ocular Hygiene:
Ocular hygiene has undoubtedly greatly emphasized as an adjunct to the control of myopic progression.

Management Of Complications
1. Retinal Breaks And Detachment
Treatment of retinal breaks is much rewarding than is, the attempted repair of an advanced detachment. **Yanoff** has recommended the use of cryo retinal ablation prophylactically. **Bensen & et al** advised treating an adequate margin of retina surrounding the lattice areas and then carrying out the treatment of ora.Retinal detachment surgery should be done taking into consideration of factors of scleral thinning and posterior staphyloma.

1. **Choroidal neovascular membrane**
a) Extra foveal CNVM – Green 514nm / Red 647 nm laser (≥200µm from to cover CNVM. centre of FAZ)

b) Juxta foveal CNVM – Laser to cover CNV contiguous (<200µm & ≥ 1µm blockage and 100 m beyond on from centre of FAZ) non foveal side
c) Sub foveal – Photodyanamic therapy

2. **Ocular Hypertension And Glaucoma Management**
The goal of glaucoma treatment is to preserve good visual function for the patients life time.

3. **Management Of Cataract**
Either phacoemulsification or SICS with proper IOL implantation

4. **Management Of Strabismus And Amblyopia**
Early squint correction is accepted as the most beneficial approach to congenital tropias associated with myopia**(Taylor).** Appropriate spectacles and occlusion therapy is advocated to manage amblyopia.

5. **Management Of Retinitis Pigmentosa**
Low vision aids and genetic counselling.

6. **Newer Modality Of Treatment** - intravitreal injection of Bivacizumab seems to be an effective and safer treatment for macular CNVM. **(Sakaguchi, Ikumo) BJO, 2006 Aug 16.**

AIM OF THE STUDY
To analyze the clinical features and biometric parameters visual parameters in relation to posterior polar changes and disc changes, the incidence of retinal degenerations and detachment, association of other ocular association like lens changes, open angle glaucoma, retinitis pigmentosa, strabismus in pathological myopia.

MATERIALS AND METHODS
This study was carried out at Peripheral District Head Quarters Hospital, kallakurichi, Tamil Nadu State in a period of three years (March 2016 - February 2019. This is a prospective study. Cases were registered, evaluated, treated and followed up during the study period

Inclusion Criteria:
a. Patients with a refractive error of > 6.00 D.
b. Patients with normal corneal curvature.
c. Patients with axial length of > 24 mm.

Exclusion Criteria :
a. Patients with index myopia.
b. Patients with abnormal corneal curvature.(curvature myopia were excluded).
c. Low degrees of myopia and congenital myopia.
d. Other ocular pathologies like micro ophthalmos, ROP, ectopia lentis were excluded.

Study Design:
1. History of refractive error including duration, age at which spectacle were worn for the first time, time of last change of spectacles, complaints with present spectacles, Family history of myopia.
2. History of other symptoms like progressive loss of vision, defective vision related to day or night, sudden loss of vision, flashes and floaters.

All of them were subjected to routine ophthal examination including refraction and detailed fundus examination with drawing and were documented.

Anterior segment SLE was done to rule out other pathology. Routinely IOP was measured by applanation tonometer for all the patients. The axial length was measured using Ascan biometry and keratometer was done. Those with abnormal K- reading were excluded from the study.Visual acuity recorded & improvement with glasses noted. Those patients with posterior pole changes were picked up for further investigations.

Patients with macular pathology were followed up with FFA and documented. Those with posterior staphyloma were confirmed with B scan. The incidence of various degenerations were recorded and analyzed , evaluated and treated accordingly.

Those patients who presented with complications as well as who had complications during the study period were treated accordingly. Those

with retinal tears were treated with barrage LASER and also with anterior retinal cryopexy. And all were followed up periodically.

OBSERVATION & ANALYSIS:

Analysis Depending On Various Retinal Changes In The Posterior Pole

Retinal changes	Number of eyes	Percentage
Posterior staphyloma	10	10.41%
Temporal crescent	44	45.83%
Tigroid fundus	47	48.94%
Peripapillary atrophy	33	34.37%
CRAP	28	29.16%
Vitreous pathology.	**Number of eyes**	**Percentage**
Vitreous fibrillations and strands	22	22.91%
PVD	14	14.58%
SRNVM	5	5.20%
Medullated nerve fibre	1	1.04%
Retinoschisis	1	1.04%
Macular Pigmentary stippling	3	3.12%
Lacquer cracks	2	2.08%
Forster fuchs spots	4	4.16%
Bony spicules	10	10.41%

Analysis Of Retinal Changes In Periphery, Other Ocular Findings:

Retinal changes	Number of eyes	Percentage
Lattice degeneration	13	13.54%
Paving stone degeneration	10	10.41%
WWOP	9	9.37%
Snail track degeneration	5	5.20%
Retinal tear	2	2.08%
RP	10	10.41%
Retinal detachment	9	9.37%
Postr subcapsular cataract	8	8.33%
SRNVM	5	5.20%
POAG	4	4.16%
Strabismus	2	2.08%
Retinoschisis	1	1.04%

DISCUSSION

96 eyes of 50 patients with pathological myopia were studied, of which its incidence was common between the age group 21 to 30 years , which correlated well with Framingham Eye study group, suggesting that aging in addition to mechanical stretching is also important for the development of the fundus changes.

Sex appears to have an influence on incidence. Females are more prone to higher degrees of myopia as well as degenerative changes occurring in high myopia.

Only 8%of cases had family history of myopia , majority of the cases did not have a significant family history. Reduced incidence may be due to lack of awareness among the low socio economic group.

Majority of patients in this study were from student community which suggests that those people are more aware of their refractive error and seek ophthalmic opinion earlier.

Out of 50 cases of pathological myopia 46 had bilateral presentation and only 4 persons had unilateral occurrence. In cases of unilateral myopia good prognosis for mono ocular visual acuity as well as binocular vision is expected if timely and consistent therapy is administered.

Nearly 80% of patients with myopia fell into the dioptric range of - 6 to -14 D, which indicates that extreme degrees of myopia is relatively less frequent and suggests that greater the dioptre is, harder the vision can be ideally corrected.

Majority of eyes included in this study has an axial length ranging between 26 – 28mm (**Liull et al**), which shows that axial elongation of the eye ball is the main component causing myopic progression.

Among the study group, about 4%had an elevated IOP of more than 20 mm Hg by applanation tonometry (**Blue mountain study group**).

Out of 96 eyes even after full correction with glasses, in majority of them (36%) BCVA improved to only 6/18 to 6/36, which shows that the higher the diopteric power , the harder the vision can be ideally corrected.The greater the pathologic changes at the posterior pole , the severer the degree of damage(**Journal Eye Science: 2003 Dec 19(4) 211 – 4).** More than 50% of cases in this group had vitreous abnormalities which suggests that liquefaction of the vitreous begins at an earlier age in patients with high myopia and progresses with age and axial elongation and thus results in a frequent occurrence of PVD(14%)- **Morita h,Funata M et al Retina 1995 15(2):117-24.**

Majority of patients in this study group had temporal crescent and tesselated fundus as a common feature followed by Posterior staphyloma- 10%,SRNVM – 5.20%, Forster Fuchs spots – 4.16% and Lacquercracks–2.08%, which correlates well with the study conducted by **Brasil et al (Arq.Bras Ophthal Mar-April,69(2) 203-6).**

Lattice degeneration was the commonest type of peripheral degeneration noted (**Celorio J M et al**).The prevalence of lattice degeneration is influenced by the amount of axial elongation in highly myopic eyes.(**Amj : 1991 Jan 15 (11) 1:20:3).**

a) Myopic patients had higher risk of glaucoma compared with that of non myopic subjects (**Ophthalmology 2000 Jun 107(6) 1026-7 -The blue mountain study**).

b) Other associations noted were Posterior subcapsular cataract **(Lim et all)** ,Strabismus , Retinitis pigmentosa and Retinal detachment.

Among the predisposing factors leading to RD, lattice with hole was the leading factor followed by paving stone degeneration. Among the number of lattice degeneration noted majority of them were seen in the supero temporal quadrant probably due to excessive stretching and increased vascularity in this area.

Patients with refractive status of more than 10 D showed a higher risk of RD , showing that the risk of RD is directly proportional to the higher degrees of myopia (ie, axial lengthening).

Hence this study demonstrates that the fundus findings in moderately to high myopic patients were prominent in the posterior pole. This information may be useful when evaluating and following patients with moderate to high degrees of myopia especially after surgical refractive modification.

CONCLUSION

Pathological myopia is a complex eye disease in which the patients not only present with visual morbidity but also have a diseased eye. Hence they have to be approached according to their needs & presentations. Degenerative changes are more commonly seen in higher degrees of myopia & so all cases of myopia must be examined meticulously with indirect ophthalmoscope which can pick up complications at the earliest & can be treated effectively. This can aid in retaining useful ocular function. Awareness need to be created among myopic population regarding visual hygiene, safety precautions, risks & complications involved. They have to be informed about the warning signs & symptoms to report early for better management. hence all patients with pathological myopia should be monitored periodically. **Genetic counseling & low vision aids** are advised whenever necessary.

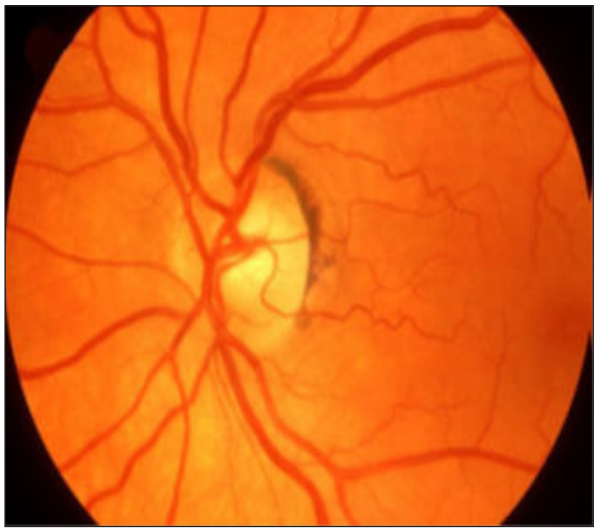

Figure -1 Normal Fundus

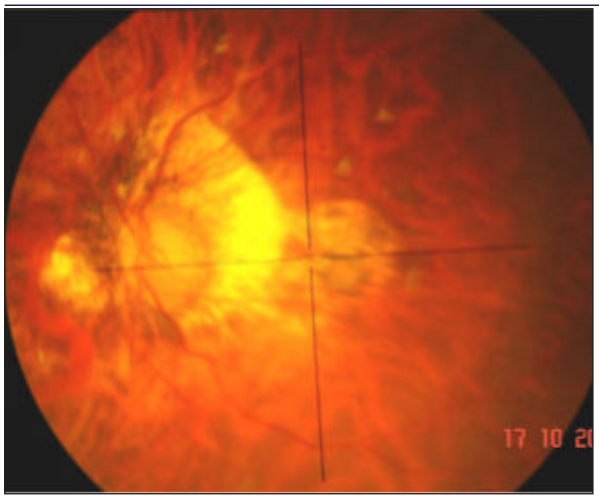

Figure-2 Tesselated Fundus

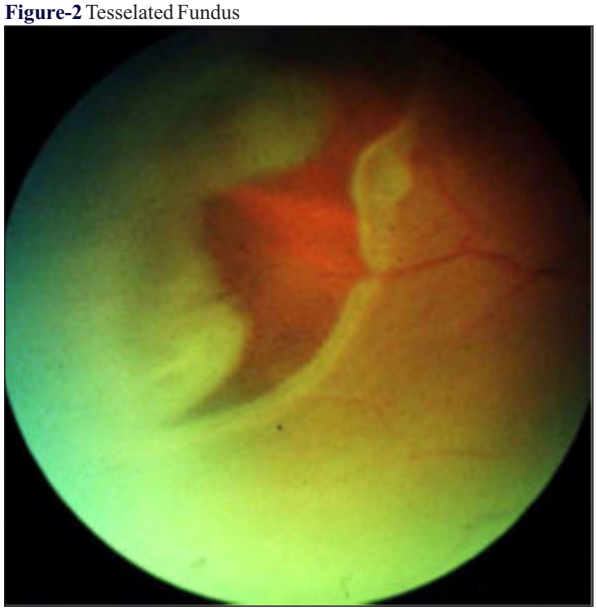

Figure-3: Retinal Tear

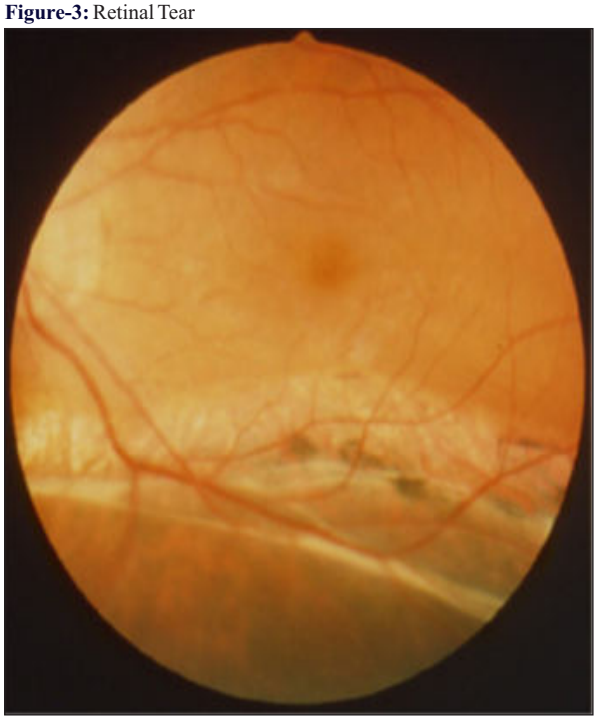

Figure-4: Retinoschisis

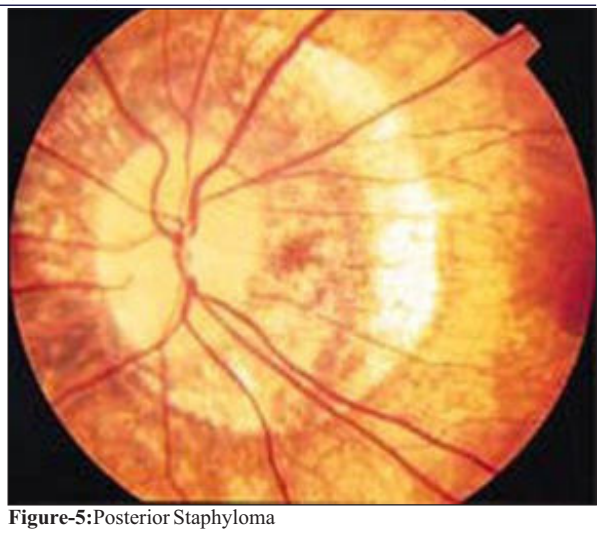

Figure-5: Posterior Staphyloma

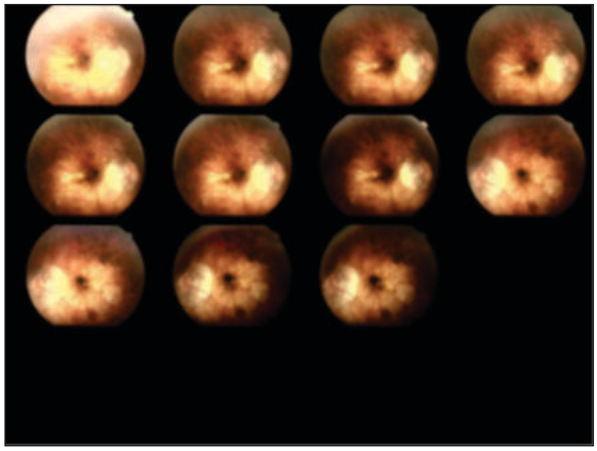

Figure-6: Fundus photographs in Myopia

Table 1

ANALYSIS DEPENDING ON BEST CORRECTEDVISUAL ACUITY

BCVA	Number of eyes	Percentage
6/6 – 6/18	18	18.75%
6/18 – 6/36	35	35.41%
6/36 – 6/60	23	23.95%
6/60 – 1/60	7	7.29%
<1/60	13	13.45%

Table2

IOP	Number of eyes	Percentage
< 10	4	4%
10 – 12	5	5%
12 – 14	30	30%
14 – 16	30	30%
16 – 18	21	21%
18 – 20	6	6%
> 20	4	4%

Table-3

Age in	Number of patients	Percentage
0 -10	3	6%
11-20	15	30%

21-30	19	38%
31-40	7	14%
41-50	4	8%
>50	2	4%

Table-4

Visual acuity	Number of eyes involved	Percentage
6/60 – 4/60	33	34.37%
4/60 – 2/60	35	36.45%
2/60 – 1/2/60	17	17.70%
HM/CFCF/PL	11	11.45%

Table-5

Refractive status	Number of eyes	Percentage
-6 to -10 D	35	36.45%
-10 to -14 D	31	32.29%
-14 to -18 D	7	7.29%
-18 to -22 D	7	7.29%
> - 22 D	3	3.12%

REFERENCES:

1. Azad Raj Vardhan, Nayak BK, Sharma YR, Tiwari Hem K, Khosla PK. Risk factor profile in retinal detachment. Indian Journal of Ophthalmology , Year 1988, Volume 36, Issue 3
2. Avitabile T et al . Prophylactic treatment of the fellow eye of patients with retinal detachment: a retrospective study. .Graefes Arch Clin Exp Ophthalmol. 2004 Mar;242(3):191-6. Epub 2004 Feb 10
3. Banerjee J.School myopia, proc, All India oph. Society 3:168 , 1933
4. Brasil OF et al .[Fundus changes evaluation in degenerative myopia] Arq Bras Oftalmol. 2006 Mar-Apr;69(2):203-6.
5. Christine Younan et al.Myopia and Incident Cataract and Cataract Surgery: The Blue Mountains Eye Study.
6. Hussain Nazimul, Das Taraprasad, Vashist Urvish, Sumashri Kallukuri. Verteporfin therapy for myopic choroidal neovascularisation in Indian eyes (one year results). Arq Bras Oftalmol. 2006 Mar-Apr;69(2):203-6. Indian Journal of Ophthalmology , Year 2004, Volume 52, Issue 3
7. Li H et al. Yan Ke Xue Bao. 2004 Mar;20(1):57-62 Fundus analysis and visual prognosis of macular hemorrhage in pathological myopia without choroidal neovasculopathy.
8. Martin Sanch, ez MD, Roldan Pallares M . Myopia: frequency of lattice degeneration and axial length.Arch Soc Esp Oftalmol. 2001 May; 76(5):291-6.
9. Sakaguchi H Intravitreal injection of bevacizumab for choroidal neovascularization caused by pathological myopia. Br J Ophthalmol. 2006 Aug 16; 293-9.
10. Schulka KN Myopia ,Indian journal of ophthalmology ^:1,1945
11. Steidl SM,et alMacular complications associated with posterior staphyloma. .Am J Ophthalmol. 1997 Feb;123(2):181-7
12. SW Hyams, M Bialik and E Neumann. Myopia-aphakia. . Prevalence of retinal detachment
13. Visual outcomes for high myopic patients with or without myopic maculopathy: Y-F Shih1, T-C Ho1, C K Hsiao2 and L L-K Lin1. British Journal of Ophthalmology 2006;90:546-550.