



## Myopic Related Fundus Changes in Subjects with High Myopia at Al-Ibrahim Eye Hospital, Karachi

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### Abstract

**Aim:** To determine the myopic related fundus changes in subjects with high myopia at Al-Ibrahim Eye Hospital age-wise and gender-wise.

**Methodology:** This cross-sectional descriptive study conducted at Al-Ibrahim Eye Hospital, Karachi. 69 eyes of 36 patients were included. Study duration was from July to December 2022. Inclusion criteria included eye with high myopia of  $\geq -5.00$  D and with clear ocular media. All patients were in between ages of 16-30 years. Patient underwent ophthalmic procedure i.e. visual acuity, refraction, axial length measurement and dilated slit lamp examination. Patients were then sent for indirect ophthalmoscopy for myopic related fundus changes. All the information was recorded in self-made Proforma. Data was analyzed using SPSS.

**Results:** Mean spherical equivalent of right eye was  $-7.61 \pm 2.41$  and for left eye was  $-7.65 \pm 2.82$ . Mean axial length for right eye was  $25.85\text{mm} \pm 1.08$  and for left eye was  $25.86\text{mm} \pm 1.25$ . This study showed that myopic crescent (27.5%) was most common finding among 69 eyes followed by lattice degeneration (14.4%), white without pressure (11.5%), chorioretinal atrophy (10.1%), tilted disc (8.6%), snail track degeneration (4.3%), bull's maculopathy (2.8%), temporal crescent (2.8%), lacquer cracks (1.4%), fundus tigroid (1.4%), peripheral retinal degeneration (1.4%), posterior vitreous degeneration (1.4%) and oval disc (1.4%). 27 (39.1%) eyes were healthy.

**Conclusion:** This study concluded that myopic crescent was the most common finding among myopic patients. Patients in mid-20 were more affected while both females and males were equally affected.

**Keywords:** Myopia; High Myopia; Fundus Changes; Myopia Related Fundus Changes

### Introduction

Myopia, a refractive error that is primarily attributed to eye elongation, has the potential to result in irreversible vision impairment, particularly amongst individuals who are of working-age [1]. Whilst high myopia is defined as spherical equivalent  $\geq -5.00$  diopter or more [2]. Myopia is linked to other ocular diseases like cataract, glaucoma, macular degeneration, and retinal detachment, it is more than just an optical issue [3-5].

The majority of the aforementioned characteristics exhibit a direct correlation with axial length (AL) elongations well as the reduction of retinal thickness.

Globally, 1406 million people are myopic that is about 22.9% of the world population and there will be 4758 million people with myopia (49.8% of world population) by 2050. There are 163 million people with high myopia making for about 2.7% of the world population [6]. Taiwanese have the highest prevalence of myopia among all school children worldwide [7]. High myopia is one of leading cause of social blindness and it has strong relation with axial length [8]. Younger individuals with Rhegmatogenous Retinal Detachment (RRD) were more myopic than older ones and myopia is most important risk factor for RRD in younger individual than older in Indonesia [9]. Myopic macular degeneration (MMD), also known as myopic maculopathy or myopic retinopathy, is one of the

main causes of visual impairment (VI) due to myopia [10]. The definition of MMD exhibits considerable variation in the literature. However, it typically encompasses retinal features associated with myopia, such as tessellated fundus, lacquer cracks, myopic chorioretinal atrophy, as well as staphyloma [11,12]. Pathologic myopia is a term commonly employed, encompassing various conditions such as posterior staphyloma, myopic choroidal neovascularization (CNV), Fuchs spot, lacquer cracks, or myopic maculopathy, which are deemed to be equivalent or even more serious than diffuse choroidal atrophy [13]. Tessellated fundus and temporal crescent were the most common fundus findings in Kashmiri population with high myopia while CNV and retinal holes were rare finding [14] while dome-shaped macula (DSM) is found in 10.77% of highly myopic eyes among Chinese [15].

## Methodology

This was a cross-sectional descriptive study conducted at Al-Ibrahim Eye Hospital Karachi in 2022. Study duration was from July to December 2022.

A sample of 62 was calculated by Rao soft sample calculator by using prevalence of high myopia as 4.2% [16], with 95% confidence interval and 5% of margin error. 69 eyes (36 patients) were included in this study in between age group of 16-30 years with spherical equivalent of  $\geq -5.00D$ . Patients were divided in to 3 groups on the basis of age: Group 1 included patients in between age group of 16-20 years, Group 2 included patients in between age of 21-25 years and Group 3 included patients in between age of 26-30 years. 18 patients were in Group 1, 12 patients were in Group 2 and 06 patients were in Group 3.

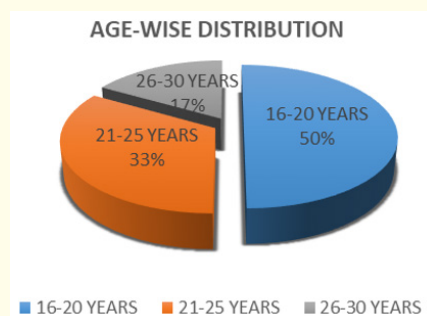
Patients with Spherical equivalent  $\geq -5.00$  dioptre, Clear refractive media, Both Gender and Age ranged from (16-30 years), were included while subjects with Cataract, Glaucoma, Uveitis, Keratoconus, Mentally retarded, strabismus, Ocular Trauma, Eye infections, Corneal abnormalities and any other corneal pathologies were excluded. The protocol for examination for all patients who fulfill our inclusion criteria included demographic data and history. Visual Acuity was recorded separately for both distance and near, with and without glasses using Snellen chart. Subjective refraction was the next step to achieve best corrected visual acuity. Patients were then sent for axial length measurement and then slit lamp examination was done using 90D lens. All the information was recorded in self-made Performa for this research. After that patients were referred to ophthalmologist for Fundoscopy through

indirect ophthalmoscope to check myopic related fundus changes in subjects with high myopia. 69 eyes were analyzed by SPSS version 20.

## Results

A total sample of 69 eyes of 36 patients were included, 3 eyes were excluded at the time of data analysis. Sample was divided into 3 groups according to age i.e. Group 1 included patients between 16-20 years of age (18 patients, 50%), Group 2 included patients between age 21-25 years (12 patients, 33.3%) and Group 3 included patients between ages 26-30 years (6 patients, 16.7%) (As shown in Figure 1). Among 36 patients 16 (47%) were males and 17 (52%) were females (as shown in Figure 2).

Mean spherical equivalent of right eye was  $-7.61 \pm 2.41$  and for left eye was  $-7.65 \pm 2.82$ . Mean axial length for right eye was  $25.85mm \pm 1.08$  and for left eye was  $25.86mm \pm 1.25$ . All patients underwent indirect ophthalmoscopy for myopic related fundus changes. This study showed that myopic crescent (27.5%) was most common finding among 69 eyes followed by lattice degeneration (14.4%), white without pressure (11.5%), chorioretinal atrophy (10.1%), tilted disc (8.6%), snail track degeneration (4.3%), bull's maculopathy (2.8%), temporal crescent (2.8%), lacquer cracks (1.4%), fundus tigroid (1.4%), peripheral retinal degeneration (1.4%), posterior vitreous degeneration (1.4%) and oval disc (1.4%). Most of the patients have more than single fundus changes while 27 (39.1%) eyes were healthy (As shown in Table 1). Myopic changes were more common in mid-20's (as shown in table 2). Males and females were equally affected (as shown in Table 3).



**Figure 1:** Age-wise distribution of the sample.

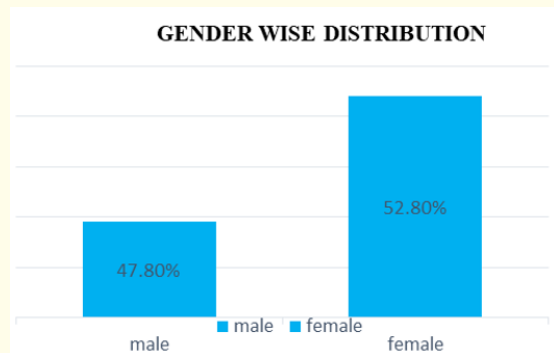


Figure 2: Gender-wise distribution of the sample.

Table 1: Frequency of Myopic Related Fundus Changes.

| S.no. | Retinal changes                 | Frequencyn (%) |
|-------|---------------------------------|----------------|
| 1     | Myopic crescent                 | 19 (27.5%)     |
| 2     | Lattice degeneration            | 10 (14.4%)     |
| 3     | White without pressure          | 8 (11.5%)      |
| 4     | Chorioretinal atrophy           | 7(10.1%)       |
| 5     | Tilted disc                     | 6 (8.6%)       |
| 6     | Snail track degeneration        | 3 (4.3%)       |
| 7     | Bull's maculopathy              | 2 (2.8%)       |
| 8     | Temporal crescent               | 2 (2.8%)       |
| 9     | Fundus tigroid                  | 1 (1.4%)       |
| 10    | Lacquer cracks                  | 1 (1.4%)       |
| 11    | Posterior vitreous degeneration | 1 (1.4%)       |
| 12    | Oval disc                       | 1 (1.4%)       |
| 13    | Peripheral retinal degeneration | 1(1.4%)        |
| 14    | Healthy retina                  | 27 (39.1%)     |

Table 2: Myopic Related Fundus Changes in Different Age Group.

| Sr.NO | Fundus changes                  | 16-20 years | 21-25 years | 26-30 years |
|-------|---------------------------------|-------------|-------------|-------------|
| 1     | Myopic crescent                 | 13          | 4           | 2           |
| 2     | Chorioretinal atrophy           | 4           | 0           | 3           |
| 3     | Lattice degeneration            | 5           | 3           | 2           |
| 4     | Lacquer cracks                  | 1           | 0           | 0           |
| 5     | White without pressure          | 5           | 1           | 2           |
| 6     | Tilted disc                     | 2           | 2           | 2           |
| 7     | Fundus tigroid                  | 0           | 0           | 1           |
| 8     | Peripheral retinal degeneration | 0           | 0           | 2           |

|    |                                 |   |   |   |
|----|---------------------------------|---|---|---|
| 9  | Bull's maculopathy              | 2 | 0 | 0 |
| 10 | Snail track degeneration        | 2 | 1 | 0 |
| 11 | Temporal crescent               | 0 | 0 | 2 |
| 12 | Posterior vitreous degeneration | 0 | 1 | 0 |
| 13 | Oval disc                       | 0 | 0 | 1 |

Table 3: Myopia related fundus changes gender-wise.

| Sr.no | Fundus changes                  | Male | Female |
|-------|---------------------------------|------|--------|
| 1     | Myopic crescent                 | 10   | 9      |
| 2     | Chorioretinal atrophy           | 3    | 4      |
| 3     | Lattice degeneration            | 5    | 5      |
| 4     | Lacquer cracks                  | 0    | 1      |
| 5     | White without pressure          | 5    | 3      |
| 6     | Tilted disc                     | 2    | 4      |
| 7     | Fundus tigroid                  | 0    | 1      |
| 8     | Peripheral retinal degeneration | 0    | 1      |
| 9     | Bull's maculopathy              | 2    | 0      |
| 10    | Snail track degeneration        | 2    | 1      |
| 11    | Temporal crescent               | 2    | 0      |
| 12    | Posterior vitreous degeneration | 1    | 0      |
| 13    | Oval disc                       | 0    | 1      |
| 14    | Healthy retina                  | 13   | 14     |

## Discussion

In our study, the most common myopia related fundus change was myopic crescent same as the study conducted by Anjum., *et al.* in Srinagar, from 2017 to 2019 reported myopic crescent in 56 eyes, (50.23%) was most common finding in myopia greater than -6 Dioptres in Kashmiri population [9]. The study by Naik GT., *et al.* reported that four lesions which include crescent, a posterior staphyloma, chorioretinal atrophy and white without pressure were highly correlated with increased axial length whilst no correlation was found between Fuchs spot, lacquer crack, lattice, and retinal breaks with increasing axial length. The same study showed that the most common type of crescent was the temporal crescent (66%) [17].

Another study conducted on 100 subjects in Kanchipuram, India, showed that Tessellated fundus (90.2%) with Crescent formation (87.25%) and abnormal foveal reflex (82.35%) were most common findings in myopic patients of age in between 8-70 years. Most of myopic patient were in between 11-20 years [18].

In our research both genders were equally affected, research conducted by Samuel showed that males (54) were more affected than females (46) [11]. Our research showed that myopia related fundus changes was more prominent in younger individuals. Similarly, retrospective study conducted at Jakarta, Indonesia, by Elvioza, *et al.* showed that younger patients were more affected [19].

A consecutive, prospective, observational case series was conducted by Baba T *et al.* at high myopia clinic of the Tokyo Medical and Dental University from April 1999 to April 2007 showed that 7 eyes had foveal retinal detachment (RD), 2 eyes had foveal retinoschisis ranged between 52 to 76 years with refractive error of -13.0 to -27.0 diopters and axial length ranged from 28.6 to 32.2mm. No such findings were seen in our research [20]. Another retrospective consecutive interventional study conducted at Visum-Instituto Ophthalmologic de Alicante, Spain in 2007 on 439 high myopic eyes of 274 patients aged between 21-90 years. 32.4% were males and 67.6% were females who got IOL implanted after coaxial phacoemulsification. Their results showed that incidence of RD was 2.7% in 439 eyes. No RD was found in our subjects in between age of 16-30 years [21].

In our study lattice degeneration was found in 10 eye out of 69 eye (25.6%). Another study conducted by Siyal NA *et al.* at Department of Ophthalmology, Dow University of Health Sciences and Civil Hospital Karachi from 10th October 2007-9th April 2008 showed that lattice degeneration was common in myopic patients and middle aged females were at high risk. 80% were bilateral cases and associated with atrophic holes in 15% case. Axial length was also associated with the lattice retinal degeneration [22].

Staphyloma and chorioretinal atrophy lesions were the most prevalent fundus findings among Asian individuals with high myopia, according to Chang L., *et al.* [23] While Koh V., *et al.* reported that even in young myopic eyes, myopia-related changes of the optic disc and macula were more common. Myopic maculopathy risk factors include ageing, a longer AL, and a decrease in choroidal thickness. Some of these changes were linked to diminished central visual function [24].

## Conclusion

This study concluded that myopic crescent was the most common finding among myopic patients. Patients in mid-20 were more affected while both females and males were equally affected.

## Recommendation

On the basis of our study we recommend that every patient with high myopia should have detailed dilated fundus examination and axial length measurements to find myopia related fundus changes at early stage. This way the vision of patient can be restored for long period of time and can prevent blindness.

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