

## Original Article

## An Analysis on Retinal Changes in Myopia

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## Abstract:

**Background:** High myopia is one of the main causes of blindness, and is closely related to excessive growth and elongation of the eyeball, leading to various changes in the retina. **Objective:** This study was carried out to investigate the Pattern of macular, peripheral retinal, and papillary changes associated with myopia in highly myopic subjects. **Material and method:** The study included 100 eyes of 52 myopic patients, having refractive error ranging from -3.00 D Spherical (sph) to -8.00 D sph, who attended the Department of Ophthalmology, CMH Rangpur, from 26/02/2023 to 28/03/2024. **Result:** 100 eyes of 52 patients were assessed, among them 32 eyes of male and 68 eyes of female patients. Among 100 eyes, 23(23%) eyes were having normal fundoscopic findings and rest 77(77%) eyes having pathological changes in fundus. Among them, 44(44%) patients having lattice degeneration, 18(18%) patients having WWOP, 21(21%) patients having vitreous condensation, 16(16%) patients having tessellated fundus, 36(36%) patients having tilted disc and 23(23%) patients having PPA of all eyes. **Conclusion:** Various pathological changes are common in high myopic cases which can cause various degree of visual impairment, if not diagnosed or treated early. So, it is very important to undergo regular check up.

**Keywords:** Myopia, Fundus findings, Retinal changes

## Introduction:

Refractive error is one of the common causes of vision loss and myopia is one of the main cause. Myopia reduces vision in students as well as adults.<sup>1</sup> This is one of the leading causes of blindness in young people.<sup>2</sup>

The retina is the innermost nerve layer of the eye that communicates with the brain. The peripheral retina is susceptible to degeneration to varying degrees due to anatomical quirks such as being thin, having poorly developed retinal cells, and lacking large blood vessels, etc. It resists less traction when there is degeneration, making it susceptible to retinal detachment.

Myopia which has a refractive range of 0.25 to 3.00 D is called low myopia and range of 3.00 to 5.00 D is called intermediate myopia. High myopia is categorized as myopia of 6.00 or more

diopeters (D).<sup>3</sup> High myopia is associated with a gradual and excessive elongation of the eyeball, leading to various changes in the posterior fundus. Clinical findings show that the incidence of myopic fundus changes gradually increases as patients age, and the incidence of retinal atrophy in highly myopic eyes increases in patients aged 40 years and older, suggesting myopic fundus changes might be rare in children as High myopia in children is rare<sup>4</sup>

Pathological myopia is defined as the presence of a variety of changes in the retina and optic disc associated with myopia, which is a subtype of myopia in which the axial length (AL) of the eyeball is excessive and occurs produce degenerative changes in the central and peripheral retina.<sup>2,5</sup> Typical fundus lesions include chorioretinal atrophy, vitreous traction, choroidal neovascularization and posterior staphyloma.

Pathological myopia usually increases with progressing age and myopia.

As some retinal complications are vision-threatening, understanding the risk factors for developing these complications with high myopia can help to identify these high-risk individuals which is able give valuable data to public on this subject of eye health and helps the ophthalmologists to recognize these factors in people at risk for myopia.<sup>6</sup>

Our objective is to explore the design of myopia-related macular, peripheral retinal and papillary changes in peoples with myopia.

#### Material and Methods:

The study includes 100 eyes of 52 patients of myopia, having refractive error ranging from -3.00 D Spherical (sph) to -8.00 D sph, who attended the Out Patient Department (OPD) of Ophthalmology, CMH Rangpur, from 26/02/2023 to 28/03/2024.

The presenting visual acuity was measured using the Snellen's distant visual acuity chart at 6 meters distance. Visual acuity measured unaided and with subjects wearing their current optical correction.

When the largest number could not be identified by the subject at 6 meters, the subject was brought closer to the chart up to 2 meters distance, then counting finger up to 1 feet, then hand movement and lastly perception of light was assessed.

Auto-refraction was obtained using the Topcon RM-800 Auto-refractometer and was refined by Ophthalmologist, and then Best Corrected Visual Acuity (BCVA) in Snellen's chart was recorded. Patients having compound myopic astigmatism, refractive error were measured by Spherical Equivalent Method.

Pupil was dilated with topical use of combination of Tropicamide and Phenylephrine. When pupil is fully dilated, fundus was examined in supine position with Indirect Ophthalmoscope with 20D condensing lens.

Tilted disc, Peripapillary Atrophy (PPA), fuch's spot, lacquer crack, posterior staphyloma and posterior vitreous detachment were noted as posterior pole lesions and lattice degeneration, paving stone degeneration, White Without Pressure (WWOP), vitreous condensation,

tessellation of fundus, retinal breaks were noted as peripheral lesions.

#### Result:

100 eyes of 52 patients were assessed, among them 32 eyes of male patients and 68 eyes of female patients. 50 were Right Eye (R/E) and 50 were Left Eye (L/E).

Among 100 eyes, 23 eyes were having normal fundoscopic findings which is 23% of total eyes and rest 77 eyes having pathological changes in fundus which is 77% of total eyes.

Among them, 44(44%) patients having lattice degeneration, 18(18%) patients having WWOP, 21(21%) patients having vitreous condensation, 16(16%) patients having tessellated fundus, 36(36%) patients having tilted disc and 23(23%) patients having PPA of all eyes.

**Table-I: Age Distribution (Out of 100 Eyes)**

Age in year	No. of Patients	Percentage (%)
≥10	9	9
11-15	27	27
16-20	15	15
21-25	41	41
≤26	8	8
Total	100	100

**Table-II: Gender Distribution**

Gender of Patients ww	Out of 52 Patients		Out of 100 Eyes	
	No. of Patients	Percentage (%)	No. of Eyes	Percentage (%)
Male	16	30.77	32	32
Female	36	69.23	68	68

**Table-III: Ocular Involvement (Out of 52 Patients)**

Ocular Involvement	No. of eyes	Percentage (%)
Bilateral	48	92.31
Unilateral	4	07.69
Total	52	100

**Table-IV: Refractive Power Distribution**

Refractive Power	No. of Eyes	Percentage (%)
-3.00	7	
-3.50	4	
-4.00	8	66
-4.50	16	
-5.00	19	
-5.50	12	
-6.00	10	
-6.50	7	
-7.00	6	34
-7.50	8	
-8.00	3	
Total	100	100

**Table-V: Fundoscopic Findings (Out of 100 Eyes)**

Fundus Finding	Male	Female	Total No. of Eyes	Percentage (%)	
				Male (Out of 32)	Female (Out of 68)
Normal	12	11	23	37.5	16.18
Lattice Degeneration	14	30	44	43.75	44.12
WWOP	9	9	18	28.12	13.23
Vitreous Condensation	6	15	21	18.75	22.06
Tessellated Fundus	1	15	16	3.125	22.06
Tilted Disc	10	26	36	31.25	38.23
PPA	6	17	23	18.75	25.00

**Discussion:**

Among 100 eyes, 32 male eyes which is 32 % and 68 female eyes which is 68 % of all eyes, showing that female eyes are more commonly myopic than male eyes.

Chang et al identified that in Singapore, among 332 cases 147(44.28%) male and 185(55.72%) female patients,<sup>5</sup> Gozum et al identified that in Turkey, among 109 cases 48(44.04%) male and 61(55.96%) female patients,<sup>2</sup> which showed that female were more affected.

Out of 100 eyes, 23 eyes having normal fundus findings, among them 12 male eyes which is 37.5% among male eyes and 11 female eyes which is 16.18% of female eyes. So it is evident that male eyes having more normal findings than female eyes.

44 eyes having Lattice degeneration, 14 were male eyes which is 43.75% among male eyes and 30 female eyes which is 44.12% among female eyes. It shows that lattice degeneration affects almost equally in both sex.

Celerio and Pruett identified Lattice degeneration occurred in 24.1% of eyes with myopia greater than 6.00 D and Lai et al reported that 13.6% of Chinese adult eyes with myopia greater than 6.00 D had Lattice degeneration.<sup>6,7</sup> In this study, we have found 21 out of 34 cases with more than 6.00 D of myopia having Lattice degeneration which is 61.76%.

Lattice degeneration can occur at an early age and peaks in the second decade of life. In this study, we have found that,  $\leq 10$  years 2 out of 9(22.22%), 11-15 years 10 out of 27(37%), 16-20 years 6 out of 15(40%), 21-25 years 22 out of 41(53.66%) and  $\geq 26$  years 4 out of 8(50%) having Lattice degeneration, which is showing that it is increasing with growing age.

18 eyes having WWOP, 09 were male eyes which is 28.12% among male eyes and 09 female eyes which is 13.23% among female eyes. It shows that WWOP affects male eyes more than female eyes.

21 eyes having Vitreous condensation, 06 were male eyes which is 18.75% among male eyes and 15 female eyes which is 22.06% among female eyes. It shows that Vitreous condensation affects slightly higher in female eyes.

16 eyes having tessellated fundus, 01 were male eye which is 3.125% among male eyes and 15 female eyes which is 22.06% among female eyes. It shows that female eyes having more tessellated fundus than male eyes.

36 eyes having Tilted disc, 10 were male eyes which is 31.25% among male eyes and 26 female eyes which is 38.23% among female eyes. It shows that female eyes having more

tilted disc than male eyes.

23 eyes having PPA, 06 were male eyes which is 18.75% among male eyes and 17 female eyes which is 25% among female eyes. It shows that female eyes having more PPA than male eyes.

Chang et al identified, among Singaporean adults with high myopia from population-based surveys, fundus pallor and tessellation (90%), peripapillary atrophy 268(81.2%), and optic disc tilt 190(57.4%) were very common findings. Peripapillary atrophy was the most common manifestation associated with the myopic fundus, observed in 268 subjects (81.2%)<sup>(5)</sup>. In our study, we have found tessellation 16(16%), peripapillary atrophy 23(23%), and optic disc tilt 36(36%), which shows that Tilted disc is most common disc findings.

Posterior vitreous detachment and posterior staphyloma were not found in any cases as posterior pole lesions and paving stone degeneration, retinal breaks were not found as peripheral retinal lesions.

#### Conclusion:

This study shows that various pathological changes are common in high myopic cases which have potential risk to develop various degree of visual impairment, if not diagnosed or treated early. So, it is very important to undergo regular check up and ophthalmologist should give due importance to it. Ophthalmologist should be aware that the pattern of pathologic myopia may differ across ages and severity of refractive error. High risk adults who are older with more severe myopia could be indentified for regular screening and early management. As study shows that female patients are more prone to develop pathological changes in high myopic retina, ophthalmologist should give extra attention to them.

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