IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 21, Issue 10 Ser.1 (October. 2022), PP 37-46
www.iosrjournals.org

A Clinical Study on Posterior Segment Manifestations In Myopic Population

Fathima Fahima A[1], Hemanandini M [2]
[1](Department of Ophthalmology, Madras Medical College, India)
[2](Department of Ophthalmology, Madras Medical College, India)

Abstract:
Background*: Myopia or near-sightedness comprises a greater proportion of refractive errors. In myopes, various anatomical changes occur in the posterior segment of the globe. With advent of technological improvisation, visualization and recording of these changes have become easier. Periodic testing of myopes is important in time-to-time detection and management of posterior segment manifestations. The primary objectives of this study are to analyze the presentation of posterior segment manifestations in myopic population and to assess various ocular parameters in relation to varied dioptres of myopia.*
Materials and Methods*: This is a cross-sectional study of 104 myopic patients attending OPD at Regional Institute of Ophthalmology. All patients under study were subjected to measurement of visual acuity, intraocular pressure, axial length, corneal curvature and corneal thickness. Anterior segment examination using Slit lamp, Fundus examination using Direct Ophthalmoscopy, slit lamp bio microscopy with 90D and indirect ophthalmoscopy with 20D were done*
Results*: The age distribution of myopia was noted to be more frequent among 21- 30 years with a percentage of 49%. The myopia among the male gender was 45% and among the females was 55%. 59% of eyes had documented fundus changes. Of the fundus changes noted, the most common fundus finding was tessellations (46.6%) followed by peripapillary atrophy (15.4%). Out of 208 eyes, 77.4% had axial length of 24-25 mm. The fundus changes are more prevalent among patients with dioptric values between < -3.00D to -5.00D with a percentage of 56%.*
Conclusion: *Though it is believed that fundus changes are prevalent in high dioptric powers, fundus changes do occur among patients on lower side also. Hence routine screening of all myopic patients for fundus changes with thorough examination of retinal peripheries is essential irrespective of the degree of myopia for better management and prognosis.*
Key Word*: Refractive error, Myopia, lattice degeneration, tessellations, tilted disc, Staphyloma*

Date of Submission: 18-09-2022 Date of Acceptance: 03-10-2022

I. Introduction

Eyes are the specialized light sensitive organ in human body. It helps in telecasting systemic disorders by acting as an anatomical window. The neuronal complex system of the eye, retina plays an important role in converting the visual impulses into electrical impulses. Visual disturbances can occur due to any changes in anatomical or functional components of the eye. The major cause of visual impairment globally are refractive errors and it accounts for second major cause of visual loss. Myopia or near-sightedness comprises a greater proportion of refractive errors. In myopes, various anatomical changes occur in the posterior segment of the globe. With advent of technological improvisation, visualization and recording of these changes have become easier. Periodic testing of myopes is important in time-to-time detection and management of posterior segment manifestations.

II. Material And Methods

This study was conducted at Regional Institute of Ophthalmology and Government Ophthalmic Hospital, Egmore, Chennai. Myopic patients attending RIOGOH OPD between January 2021 – August 2021 were selected randomly, abiding with inclusion and exclusion criteria. After getting consent from the patient, detailed history and his/her family history was taken. All patients under study were subjected to measurement of visual acuity (Uncorrected and best corrected visual acuity), intraocular pressure (Goldmann applanation tonometry), axial length, corneal curvature and corneal thickness. Anterior segment examination using Slit lamp, Fundus examination using Direct Ophthalmoscopy, slit lamp bio microscopy with 90D and Indirect ophthalmoscopy with 20D were done.

Inclusion Criteria:

- Age ≥ 10 years to ≤ 40 years
- Myopia with refractive error > 0.50 D
- Normal corneal curvature

Exclusion Criteria:

- Index Myopia
- Corneal opacities
- Post refractive surgery

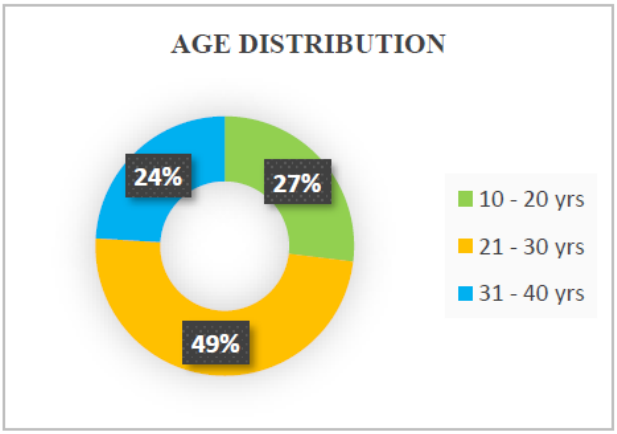
Statistical analysis

The collected data were analyzed with IBM SPSS Statistics for Windows, Version 23.0. (Armonk, NY: IBM Corp). To describe about the data descriptive statistics frequency analysis, percentage analysis was used.

III. Result

AGE			
		Frequency	Percent
	10 - 20 years	28	26.9
	21 - 30 years	51	49.0
	31 - 40 years	25	24.0
	Total	104	100.0

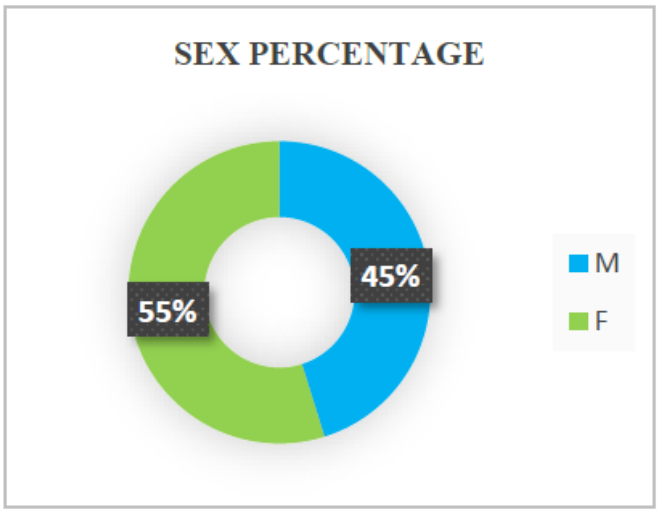
Table no 1: AGE DISTRIBUTION



As per data collected, the predominant age group of involvement was between 21-30 years which goes in line with the data obtained from study conducted by Dhakal et.al(1).

Table no 2: SEX DISTRIBUTION

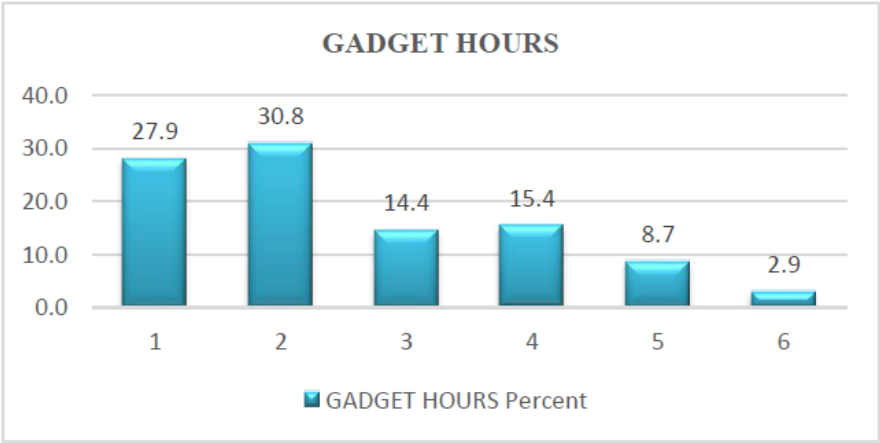
SEX			
		Frequency	Percent
	Male	47	45.2
	Female	57	54.8
	Total	104	100.0



The data collected suggests increased prevalence of myopia among females (55%) which correlates well with Beaver Dam Study(2).

Table 3: GADGET HOURS CORRELATION

GADGET HOURS			
		Frequency	Percent
	1	29	27.9
	2	32	30.8
	3	15	14.4
	4	16	15.4
	5	9	8.7
	6	3	2.9
	Total	104	100.0

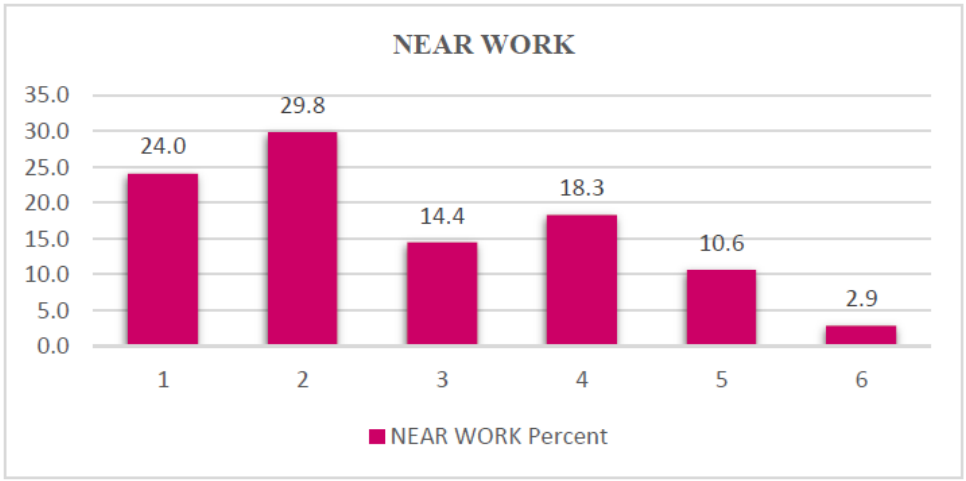


In this study, the duration of gadget use per day was found to 1-6 hours with higher percentage of usage ranges to 2 hours per day. Earlier studies revealed enhanced progression of myopia with gadget time more than 4 hours per day(3).

Table 4: NEAR WORK

NEAR WORK			
		Frequency	Percent
	1	25	24.0
	2	31	29.8
	3	15	14.4

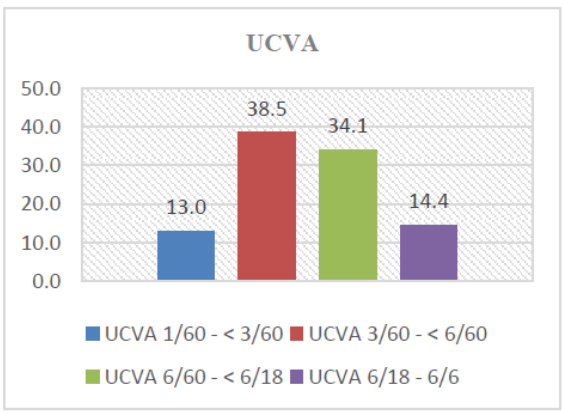
	4	19	18.3
	5	11	10.6
	6	3	2.9
	Total	104	100.0

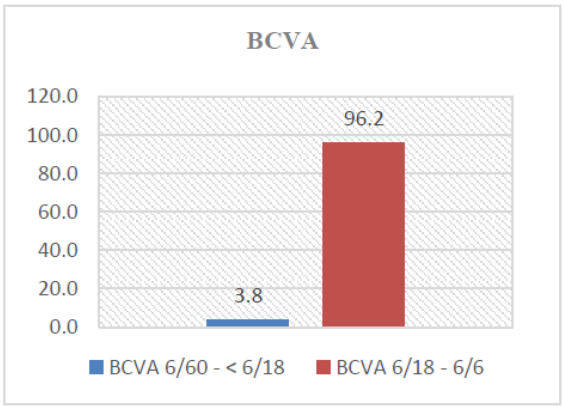


The hours of near work on an average were found to be 2 hours per day. The increased near work for >30 minutes is a significant factor in progression of myopia(4).

Table 5: UNCORRECTED AND BEST CORRECTED VISUAL ACUITY

UCVA			
		Frequency	Percent
	1/60 - < 3/60	27	13.0
	3/60 - < 6/60	80	38.5
	6/60 - < 6/18	71	34.1
	6/18 - 6/6	30	14.4
	Total	208	100.0
BCVA			
		Frequency	Percent
	6/60 - < 6/18	8	3.8
	6/18 - 6/6	200	96.2
	Total	208	100.0

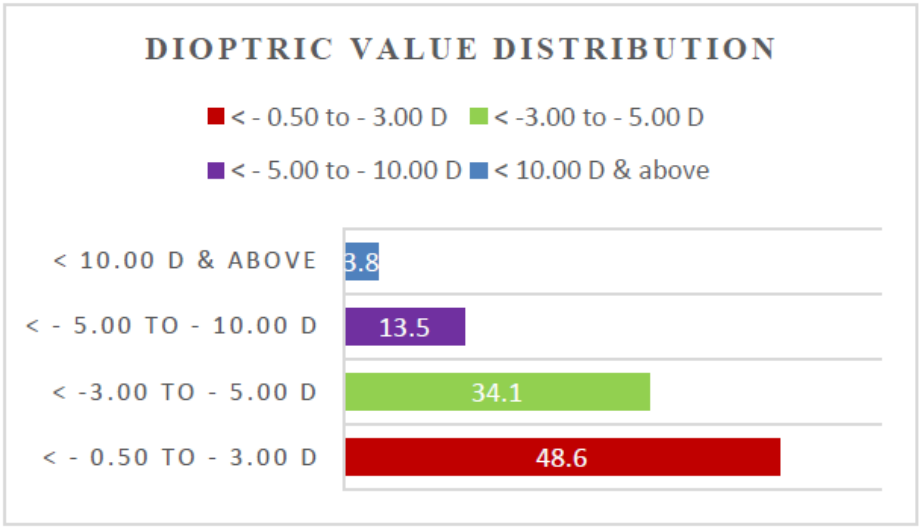




Out of 208 eyes examined, 38.5% had an uncorrected visual acuity in the range of 3/60-<6/60 followed by the range of 6/60-<6/18 in about 34.1% of eyes. The best corrected visual acuity was in the range of 6/18-6/6 in 96.2%. However, 3.8% of eyes had a best corrected visual acuity of 6/60-<6/18. This could be attributed to worser BCVA in patients with pathological myopia(5).

Table 6: DIOPTRIC VALUE COMPARISON

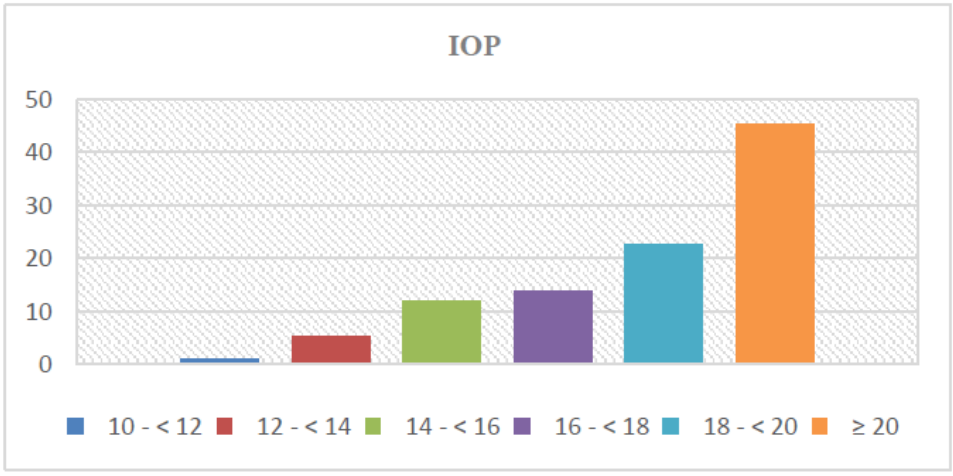
DIOPTRIC VALUE	Frequency	Percent
< - 0.50 to - 3.00 D	101	48.6
< -3.00 to - 5.00 D	71	34.1
< - 5.00 to - 10.00 D	28	13.5
< 10.00 D & above	8	3.8
Total	208	100.0



48.6% of eyes had a dioptric value of < - 0.50 to - 3.00 D followed by 34.1% of eyes with dioptric value of < - 3.00 to - 5.00 D. About 17.3% of eyes had high myopic values.

Table 7: INTRAOCULAR PRESSURE

IOP	Frequency	Percent
10 - < 12	2	1.0
12 - < 14	11	5.3
14 - < 16	25	12.0
16 - < 18	29	13.9
18 - < 20	47	22.6
≥ 20	94	45.2
Total	208	100.0



Intraocular pressure ranges to more than 20 mmHg in 45.2% of the study population

Table 8: KERATOMETRY VALUES

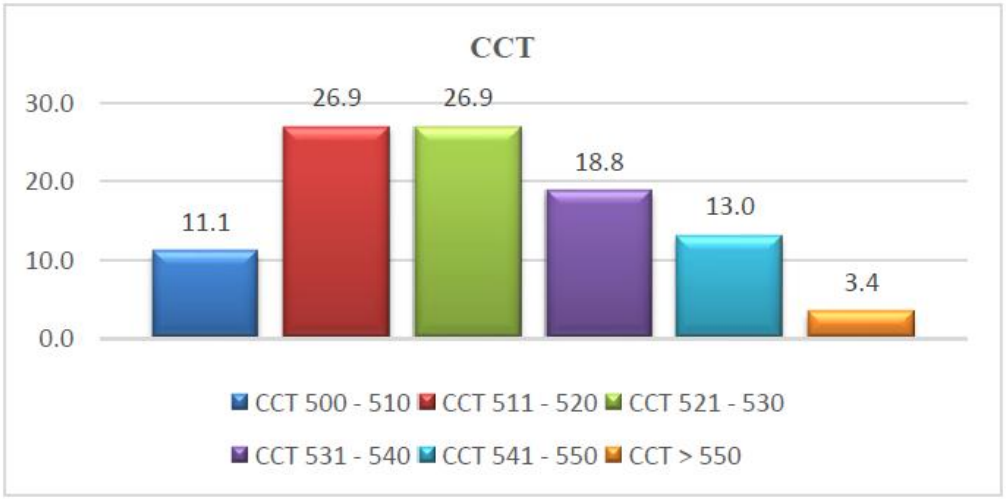
K1			
		Frequency	Percent
	< 42	4	1.9
	42.01 - 43	64	30.8
	43.01 - 44	84	40.4
	44.01 - 45	46	22.1
	45.01 - 46	8	3.8
	> 46 - <47	2	1.0
	Total	208	100.0

K2			
		Frequency	Percent
	< 42	4	1.9
	42.01 - 43	35	16.8
	43.01 - 44	104	50.0
	44.01 - 45	55	26.4
	45.01 - 46	6	2.9
	> 46 - <47	4	1.9
	Total	208	100.0

As per inclusion criteria, all eyes were within the normal corneal curvature range. Most eyes had curvature range of 43.01-44D.

Table 9: CENTRAL CORNEAL THICKNESS

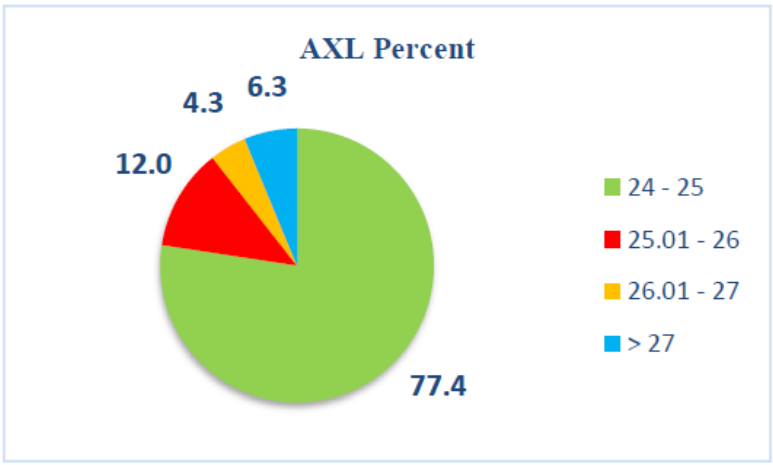
CCT			
		Frequency	Percent
	500 - 510	23	11.1
	511 - 520	56	26.9
	521 - 530	56	26.9
	531 - 540	39	18.8
	541 - 550	27	13.0
	> 550	7	3.4
	Total	208	100.0



The central corneal thickness falls within the population range and around 26.9% had CCT values of 520 ± 10microns(6). Only 7 eyes had central corneal thickness >550 microns.

Table 10: AXIAL LENGTH MEASUREMENT

AXL			
		Frequency	Percent
	24 - 25	161	77.4
	25.01 - 26	25	12.0
	26.01 - 27	9	4.3
	> 27	13	6.3
	Total	208	100.0



Out of 208 eyes, 77.4% had axial length of 24-25 mm. In a population-based study, the first peak of axial length occurred at 24mm (for low myopia) and second peak at 30mm (for high myopia) (7).

Table 11: FUNDUS CHANGES

FUNDUS	**Right**		**Left**		**Total**	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Tessellation	49.0	47.1	48.0	46.2	97	46.6
WWOP	4.0	3.8	8.0	7.7	12.0	5.8
CRA	0.0	0.0	4.0	3.8	4.0	1.9
PPA	16.0	15.4	16.0	15.4	32.0	15.4
Crescent	7.0	6.7	8.0	7.7	15.0	7.2
Tilted disc	3.0	2.9	3.0	2.9	6.0	2.9
PS	2.0	1.9	2.0	1.9	4.0	1.9
Lattice	14.0	13.5	14.0	13.5	28.0	13.5
Hole	1.0	1.0	2.0	1.9	3.0	1.4
Normal	43.0	41.3	42.0	40.4	85.0	40.9

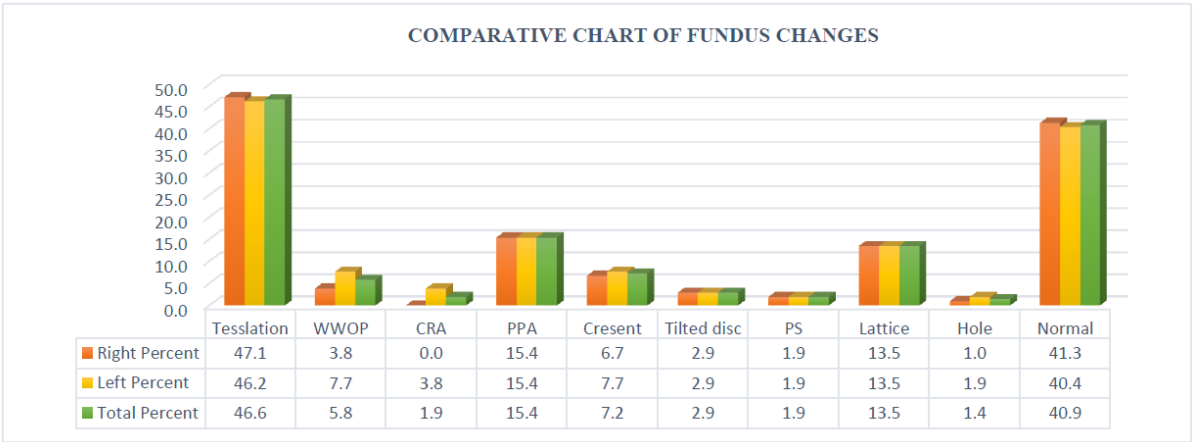
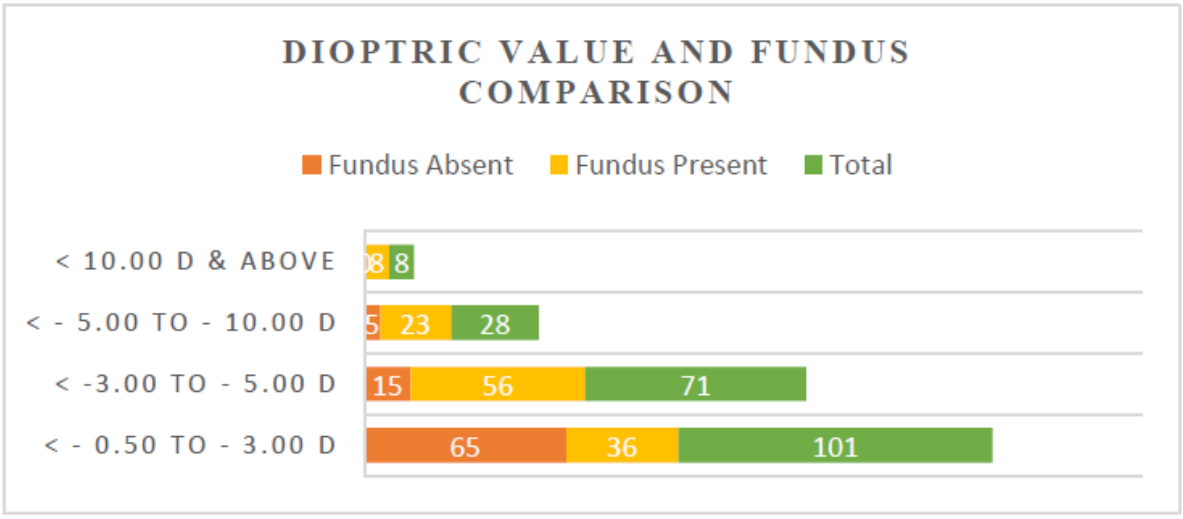


Table 12: COMPARISON OF FUNDUS CHANGES WITH DIOPTRIC VALUE

			Fundus		Total	⍰ 2 - value	p-value
			Absent	Present			
DSPH	< - 0.50 to - 3.00 D	Count	65	36	101	46.173	0.0005 **
		%	76.5%	29.3%	48.6%		
	< -3.00 to - 5.00 D	Count	15	56	71		
		%	17.6%	45.5%	34.1%		

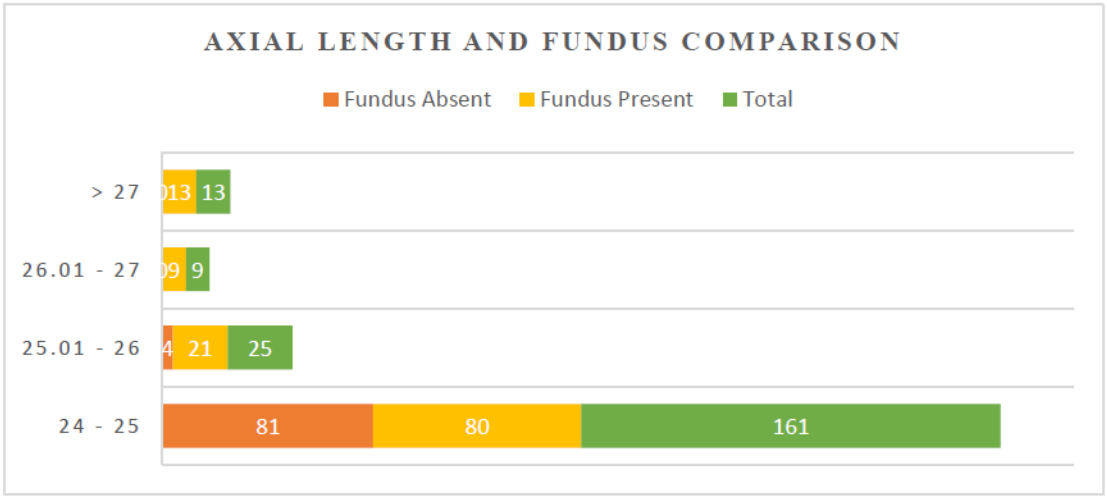
< - 5.00 to - 10.00 D	Count	5	23	28	
	%	5.9%	18.7%	13.5%	
< 10.00 D & above	Count	0	8	8	
	%	0.0%	6.5%	3.8%	
Total	Count	85	123	208	
	%	100.0%	100.0%	100.0%	
** Highly Statistical Significance at p < 0.01 level					



Among the 208 eyes studied, the fundus changes are more prevalent among patients with dioptric values between
< -3.00D to -5.00D with a percentage of 56%.

Table 13: COMPARISON OF FUNDUS CHANGES WITH AXIAL LENGTH

			Fundus		Total	⍰ 2 - value	p-value
			Absent	Present			
AXL	24 - 25	Count	81	80	161	27.543	0.0005 **
		%	95.3%	65.0%	77.4%		
	25.01 - 26	Count	4	21	25		
		%	4.7%	17.1%	12.0%		
	26.01 - 27	Count	0	9	9		
		%	0.0%	7.3%	4.3%		
	> 27	Count	0	13	13		
		%	0.0%	10.6%	6.3%		
Total		Count	85	123	208		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							



65% of fundus changes are noted among those with axial length of 24-25mm. 17.1% patients with fundus changes had axial length of 25.01 to 26mm, 10.6% of patients had axial length of >27mm and 7.3% of patients had axial length of 26.01 to 27mm

IV. Discussion

The analysis of 208 eyes of 104 patients done during the study period of 8 months and the observations from this cross-sectional study are as follows

- The predominant age group of involvement was between 21-30 years which is similar to the data obtained from study conducted by Dhakal et.al (1)
- Increased prevalence of myopia was noted among females (55%) which correlates well with Beaver Dam Study(2).
- The duration of gadget use per day was observed to be 1-6 hours with higher percentage of usage ranges to 2 hours per day. Earlier studies revealed enhanced progression of myopia with gadget time more than 4 hours per day (3).
- The hours of near work on an average were found to be 2 hours per day. The increased near work for >30 minutes is a significant factor in progression of myopia (4).
- The best corrected visual acuity was in the range of 6/18-6/6 in 96.2%. however, 3.8% of eyes had a best corrected visual acuity of 6/60-<6/18. This could be attributed to worser BCVA in patients with pathological myopia(5).
- 48.6% of eyes had a dioptric value of < - 0.50 to - 3.00 D followed by 34.1% of eyes with dioptric value of < -3.00 to - 5.00 D. About 17.3% of eyes had high myopic values.
- As per inclusion criteria, all eyes were within the normal corneal curvature range. Most eyes had curvature range of 43.01-44D.
- The central corneal thickness falls within the population range and around 26.9% had CCT values of 520 ± 10microns (6). Only 7 eyes had central corneal thickness >550 microns.
- The most common fundus finding noted was tessellations followed by peripapillary atrophy and this correlates with a study conducted by Hayashi et.al (8)
- Out of 208 eyes, 77.4% had axial length of 24-25 mm. In a population-based study, the first peak of axial length occurred at 24mm (for low myopia) and second peak at 30mm (for high myopia) (7)
- Out of 208 eyes studied, the fundus changes are more prevalent among patients with dioptric values between < -3.00D to -5.00D with a percentage of 56%. This signifies the importance of screening in mild to moderate myopes for early detection.

V. Conclusion

Refractive errors continue to be one of the commonest causes of visual impairment worldwide. Of these, prevalence of myopia seems to be in escalating trends and hence should be considered as a public health concern. Though it is believed that fundus changes are prevalent in high dioptric powers, fundus changes do occur among patients on lower side also. Hence it is important to screen in mild to moderate myopes for preventing vision threatening complications. Technological advancements have led to the usage of electronic devices both for occupational and educational purposes, which plays an important role in myopia progression. This emphasizes the importance of health education about preventive aspects in myopia by safe and limited

usage of various electronic devices and also the need for outdoor activity, thereby overcoming the duration of near work in this era of handheld devices. A routine screening of all myopic patients for fundus changes with thorough examination of retinal peripheries is essential irrespective of the degree of myopia for better management and prognosis.

References

[1]. Dhakal R, Goud A, Narayanan R, Verkicharla PK. Patterns of posterior ocular complications in myopic eyes of Indian population. Sci Rep. 2018 Dec;8(1):13700.

[2]. Klein R, Klein BEK, Linton KLP, De Mets DL. The Beaver Dam Eye Study: Visual Acuity. Ophthalmology. 1991 Aug;98(8):1310–5.

[3]. Syafi'in S, Suhita BM. Impaired Vision Function Due to Use of Gadget. J Qual Public Health. 2021 May 7;4(2):83–6.

[4]. Ip JM, Saw SM, Rose KA, Morgan IG, Kifley A, Wang JJ, et al. Role of Near Work in Myopia: Findings in a Sample of Australian School Children. Investig Opthalmology Vis Sci. 2008 Jul 1;49(7):2903.

[5]. Liu HH, Xu L, Wang YX, Wang S, You QS, Jonas JB. Prevalence and progression of myopic retinopathy in Chinese adults: the Beijing Eye Study. Ophthalmology. 2010 Sep;117(9):1763–8.

[6]. Nangia V, Jonas JB, Sinha A, Matin A, Kulkarni M. Central corneal thickness and its association with ocular and general parameters in Indians: the Central India Eye and Medical Study. Ophthalmology. 2010 Apr;117(4):705–10.

[7]. Meng W, Butterworth J, Malecaze F, Calvas P. Axial Length of Myopia: A Review of Current Research. Ophthalmologica. 2011;225(3):127–34.

[8]. Hayashi K, Ohno-Matsui K, Shimada N, et al. Long-term pattern of progression of myopic maculopathy: a natural history study. Ophthalmology. 2010;117(8):1595-1611.e16114. doi:10.1016/j.ophtha.2009.11.003.

Fathima Fahima A, et. al. "A Clinical Study on Posterior Segment Manifestations In Myopic Population." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 21(10), 2022, pp. 37-46.