



MACULAR THICKNESS IN DIFFERENT AMBLYOPIC PATIENTS IN TERTIARY CARE HOSPITAL-A CROSS SECTIONAL STUDY

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ABSTRACT The purpose of this study is to determine macular thickness in different cases of amblyopia using optical coherence tomography (OCT). Methods: A cross-sectional study was conducted in a tertiary care hospital over period of 18 months in 70 patients. After obtaining permission from the Institutional Ethics Committee (IEC). The 70 amblyopic patients were included. All cooperating patients >10 years age with unilateral moderate amblyopia and strabismic, anisometropic, and stimulus deprivation amblyopia with central fixation were included. Best corrected visual acuity, retinal nerve fiber layer thickness, average macular thickness, macular volume were measured in different quadrants. in amblyopic eyes and fellow eyes were compared. Data thus collected was compiled in Microsoft excel and analysed. **Results** Out of 70 participants, 60% were in the age group of 10 to 20 years of age. 60% cases were males while 40% were females. 50% cases having Strabismus, 40% cases had Visual deprivation, and 10% cases had Anisometric Amblyopia. In Amblyopic eyes mean vision was 0.53+/-0.3, while 0.02+/- 0.03 in normal fellow eyes. Central Macular thickness in Amblyopic eyes mean was 214.3 with SD 55.4, while that for Normal fellow eyes was 158.5 with SD 46.3. In Amblyopic eyes, mean RNFLT was 116.2, 123.2, 69.8, 85.4 and in normal fellow eyes, was 108.2, 65.7, 30.8 and 39.8 in superior, inferior, temporal and nasal quadrants respectively. **Conclusions** Central macular thickness is seen to be increased in eyes with amblyopia while no significant differences in peripapillary RTNL were found when compared with normal eyes.

KEYWORDS : Amblyopia, anisometropia, central macular thickness, optical coherence tomography

INTRODUCTION

Amblyopia is defined as decrease of visual acuity in one eye due to abnormal binocular interaction or occurring in one or both eyes as a result of pattern vision deprivation during visual immaturity.^{1,2} The prevalence of Amblyopia in children and young adults is 0.72-3.29%.² It may be secondary to strabismus, anisometropia or deprivation and changes in retina and macula had been reported by many studies with varying results.^{3,4} Hence, the purpose of our study was to measure macular thickness and RNFLT in unilateral amblyopic eyes and compare with the normal fellow eyes.

Methods

A cross-sectional study was conducted in a tertiary care hospital over period of 18 months in 70 patients after obtaining permission from the Institutional Ethics Committee (IEC) and written Informed Consent from the patients.

All patients >10 years age with unilateral moderate amblyopia and strabismic, anisometropic, and stimulus deprivation amblyopia with central fixation presenting to the ophthalmology out patient clinic were included and Uncooperative patients, mentally retarded patients, patients with retinal detachment, congenital cataract, congenital ptosis, patients who are on treatment of amblyopia. less than 10 years old patient were excluded.

All of the participants underwent a detailed ophthalmologic examination. Best corrected visual acuity, retinal nerve fiber layer thickness, average macular thickness, macular volume were measured in different quadrants. All of the parameters of the amblyopic eyes and fellow eyes were compared.

Anisometropic amblyopia was assigned as the cause if there was at least 1.0 D hyperopic difference in SE refraction between the two eyes in the absence of strabismus, 3.0 D myopic difference in SE refraction between the two eyes in the absence of strabismus or 1.5 D astigmatic difference in SE refraction between the two eyes in the absence of strabismus. Strabismic amblyopia was assigned as the cause if heterotropia was present or there was a history of previous strabismus surgery without anisometropia. Stimulus deprivation amblyopia was assigned as the cause if congenital cataract, ptosis, corneal opacities, or other media opacities obstructed vision.

The scanning was done on the normal eye first and then repeated on the

amblyopic eye in the same visit. Best corrected visual acuity (BCVA), CMT, average macular thickness, macular volume, and Retina nerve fiber thickness (RNFLT) in different quadrants were collected from the amblyopic eyes and the fellow eyes as well as the age and the sex details of all participants were collected.

Sample size calculated by formula $4pq/l^2$

Where p is prevalence taken 3.5% taken from study⁵

And l is absolute error 5%. Calculated sample size was 54 rounded off to 70 to account for missing data

Statistical analysis:

Data thus collected was entered in microsoft excel, coded and analysed by SPSS version 25 Quantitative data was described as mean and standard deviations and qualitative data was described by percentage. Data was also presented graphically. Comparison of groups was carried out by t test and ANOVA for quantitative data. Ap-value < 0.05 was taken as significant.

Results

Out of 70 participants, 35 (50%) cases were having Strabismus, (28)40% cases visual deprivation, and 7 (10)% cases had Anisometric Amblyopia. In Amblyopic eyes mean vision was 0.53+/-0.3, while 0.02+/- 0.03 in normal fellow eyes. The mean Macular thickness in Amblyopic eyes was 265.8 +/- 48.6, while in Normal fellow eyes, it was 242.5 +/- 44.8. Mean Central Macular thickness in Amblyopic eyes was 214.3 +/- 55.4, while that for Normal fellow eyes was 158.5 +/- 46.3. In Amblyopic eyes, mean RNFLT was 116.2, 123.2, 69.8, 85.4. and in normal fellow eyes, was 108.2, 65.7, 30.8 and 39.8 in superior, inferior, temporal and nasal quadrants respectively The Mean Macular thickness in Amblyopic eyes with Strabismus was 265.9, with Visual deprivation it was 269.8, with Anisometric it was 274.4. For normal fellow eyes, with Strabismus, it was 236.2, with Visual deprivation it was 242.5, with Anisometric it was 249

Table 1 Demography of patients

Age in years	Frequency	Percentages
10 to 20	42	60
20 to 30	21	30
>30	7	10
Total	70	100

Gender	Frequency	Percentages
Male	42	60
Female	28	40
Total	70	100

Table no 2 Ophthalmological examination

Visual Acuity	Mean	SD	P value
Amblyopic eyes	0.53	0.3	<0.01
Normal fellow eyes	0.02	0.05	
Average macular thickness	Mean	SD	
Amblyopic eyes	265.8	48.6	>0.05
Normal fellow eyes	242.5	44.8	
Central Macular thickness	Mean	SD	<0.01
Amblyopic eyes	214.3	55.4	
Normal fellow eyes	158.5	46.3	
Macular volume	Mean	SD	<0.01
Amblyopic eyes	7.9	0.4	
Normal fellow eyes	7.1	0.5	

SD* Standard deviation

Table no 3 Macular thickness comparing the amblyopic eye with normal eye

Types	Amblyopic eyes Mean +/- SD	Normal fellow eyes Mean +/- SD	P value
Strabismus	236.2+/- 38.7	265.9+/- 41.3	<0.01
Visual deprivation	242.5 +/-53.4	269.8+/-48.4	<0.01
Anisometric	249+/-18	274.4+/-80.7	0.1

Discussion

In our study mean age was 11.63 ± 2.84 years.

In Agrawal study there were 51 patients and mean age 11.63 ± 2.84 years.⁶

In our study, 60% cases were males while 40% were females. In Agrawal study 50.98% were males and 49.01% were females. There were 50% cases of Strabismus, 40% cases had Visual deprivation, while only 10% cases had Anisometric Amblyopia. In Agrawal study 56.86% patients were having strabismic and 43.12% had anisometric amblyopia. In our study, in Amblyopic eyes mean vision was 0.53+/-0.3, while 0.02+/- 0.03 in normal fellow eyes. In Agrawal study the mean best corrected visual acuity in amblyopic eyes was 0.53 ± 0.35 and in fellow normal eyes was -0.02 ± 0.05.⁶

Mean central Macular thickness (CMT) in Amblyopic eyes was 214.3 +/- 55.4, while for normal fellow eyes was 158.5 +/- 46.3. with p value P<0.0001 Altintas et al. found no statistically significant difference in macular thickness between the amblyopic and fellow eyes⁷

In Yoon et al. study no difference in macular thickness was reported between the amblyopic and normal fellow eyes⁸ In our study mean Macular Volume for Amblyopic eyes was 7.9 +/- 0.4, while that for normal fellow eyes was 7.1 +/- 0.5. with P<0.01. In Sah study the macular thickness and macular volume of the amblyopic eyes were slightly thicker in comparison with normal control eyes and there was no statistical significant association.³

In our study Amblyopic eyes, Mean RNFT in Superior quadrant was 116.2, in Inferior quadrant it was 123.2, in Temporal quadrant, it was 69.8, while in Nasal quadrant it was 85.4. In Normal fellow eyes, Mean RNFT in Superior quadrant was 108.2, in Inferior quadrant, it was 65.7, in Temporal quadrant, it was 30.8, while in Nasal Quadrant, it was 39.8.. Kavitha study, there was no difference in RNFLT between amblyopic eyes and normal fellow eyes.⁹

The Mean Macular thickness in Amblyopic eyes with Strabismus was 265.9, with Visual deprivation it was 269.8, with Anisometric it was 274.4. For normal fellow eyes, with Strabismus, it was 236.2, with Visual deprivation it was 242.5, with Anisometric it was 249. With p value < 0.01 seen for strabismus and visual deprivation that was statistically significant in this study. In Agrawal study the difference in mean macular thickness between normal and amblyopic eye was found to be significant statistically in strabismic with P = 0.01 but, not in anisometric amblyopia.⁶

Other Studies provide varied results.^{4,10,11,12}

Yoon study reported that the amblyopic process may involve the peripapillary RNFL, but not the macula.⁸

In Huynh SC study concluded that, central macular thickness may be increased in eyes with amblyopia, although it is not clear if this precedes or follows the development of amblyopia. No differences in peripapillary RNFL thickness were found¹³

CONCLUSIONS

Central macular thickness is seen to be increased in eyes with amblyopia while no significant differences in peripapillary RTNL were found when compared with normal eyes. Future research with large sample size and multicentric study is thus needed to see if macular thickness changes is cause or effect seen in amblyopia

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