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Original Research Article

Comparison of accommodative facility and vergence facility with and without myopia

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ABSTRACT

Aims: To compare accommodation facility and vergence facility in eyes with myopia and emmetropia.
Materials and Methods: It was a hospital-based comparative study conducted in the Outpatient Department of Ophthalmology. Accommodative and vergence facility measurements were taken with accommodative and vergence flippers.
This study was done on 50 subjects, age group between 18-30 Years and it was approved by the IRB committee. This study has done to compare the values of accommodative facility and vergence facility between myopic emmetropic patients. The accommodative facility was measured using accommodative flippers. It was done both monocularly and binocularly for each subject at 3m and 40cm. Vergence facility was measured using vergence flippers.
Results: It was confirmed that Accommodative facility [Distance and Near] in right eye, left eye, and botheye was observed as significantly lesser in Myopic patients than Emmetropia. Also, the Vergence facility wasobserved as significantly lesser in Myopic patients than the Emmetropic patients.
Conclusions: A reduced accommodative facility and vergence facility was found in myopes in comparison to emmetropia. At both distance and near, the mean facility was less for myopic eyes in comparison with emmetropic eyes.

1. Introduction

Accommodation is the ability of the eye to change focus from one object to another and to maintain the clear focus of the object.[1] The accommodative facility tests the speed of accommodative step response.[2] Convergence is a disjugate movement and the ability to turn both eyes inward together to look at a close object. It is an important part of binocular vision testing.[3] In normal binocular vision, accommodation and vergence co-operate to place on the fovea of each eye a sharp image of the object of regard. The accommodative and vergence facility is a useful predictor of visual discomfort and also academic success.[4]

2. Materials and Methods

The patients with the age group of 18-30 were taken into this study before the beginning of this study informed written consent has given and the procedure has explained clearly. The inclusion criteria include emmetropic and refractive error patients were included and a cylindrical component of less than 1.00D was included. presbyopic patients, cataracts, and squint patients were excluded. The accommodative facility was measured using accommodative manual flippers. It is a holder of a +2.00D lens and a -2.00D lens. It was done on both monocularly and binocularly for each subject at 3m and 40cm. The flipper lens was changed from plus to the minus and back again to the plus. This indicates one cycle. Vergence facility was measured using vergence flippers. It is a holder of 12 prism base

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Table 1: Descriptive statistics for age

	N	Minimum	Maximum	Mean	Std. Deviation
Age	50	17	29	21.70	2.808

Table 2: Emmetropic and myopic subjects with respect to accommodative facility [DISTANCE] OD, OS & OU:

		Mean	S.D	t value
Accommodative facility (Distance) OD	Emmetropia	15.56 cpm	3.742	7.531** (p = .000)
	Myopia	9.24 cpm	1.899	
Accommodative facility (Distance) OS	Emmetropia	15.40 cpm	4.031	6.961** (p = .000)
	Myopia	9.36 cpm	1.604	
Accommodative facility (Distance) OU	Emmetropia	17.36 cpm	3.094	7.502** (p = .000)
	Myopia	11.76 cpm	2.087	

Source: Computed from primary data

Table 3: Emmetropic and Myopic patients with regard to Accommodative Facility [NEAR] OD, OS & OU

		Mean	S.D	t value
Accommodative facility (Near) OD	Emmetropia	15.44 cpm	3.548	7.654** (p = .000)
	Myopia	9.32 cpm	1.842	
Accommodative facility (Near) OS	Emmetropia	15.96 cpm	3.284	8.703** (p = .000)
	Myopia	9.68 cpm	1.492	
Accommodative facility (Near) OU	Emmetropia	17.88 cpm	2.976	7.952** (p = .000)
	Myopia	12.44 cpm	1.685	

Source: Computed from primary data

Table 4: Emmetropic and myopic patients with regard to vergence faciliy (OU)

		Mean	S.D	t value
Vergence Facility (OU)	Emmetropia	17.60 cpm	2.327	8.379** (p = .000)
	Myopia	12.12 cpm	2.297	

Source: Computed from primary data

out and 3 prism base in prisms. The patient is asked to keep the vergence flipper close to the eyes [base in prism first] and flip the prisms when the print becomes single and clear. It was done binocularly at 40cm. The normal values for the accommodative facility for both distance and near (monocularly) is 11CPM (cycle per minute) and for binocularly is 15CPM. The normative value for vergence facility (binocularly) is 15 CPM.

3. Results

Comparison of myopic and emmetropic subjects with respect to accommodative facility [distance] OD, OS & OU

In this study, 25 subjects with Myopia and another 25 Emmetropic patients were included in this study. Accommodative facility (Distance) OD, OS & OU of 50 subjects was recorded for distance. To find the significant difference among the Myopic and Emmetropic subjects with regard to Accommodative facility, Independent Sample t-test was applied. The results are shown in the Table 2.

From the Table 3, the t-value confirms the significant difference observed between Myopia and Emmetropic subjects with respect to Accommodative facility (Distance) OD, OS & OU.This shows that Accommodative facility (Distance) OD was observed as significantly lesser in Myopic patients than the Emmetropic subjects.

Comparison of myopic and emmetropic subjects with respect to accommodative facility [Near] OD, OS & OU:

To find the significant difference among the Myopic and Emmetropic subjects with regard to Accommodative facility, Independent Sample t-test was applied. The results are shown in the Table 3.

From the Table 3, the t-value confirms the significant difference observed between Myopia and Emmetropic subjects with respect to Accommodative facility (Near) OD, OS & OU. This shows that Accommodative facility (Near) OD was observed as significantly lesser in Myopic patients than Emmetropic subjects.

Comparison of Myopic and Emmeropic Subjects with respect to Vergence Facility (OU).

To find the significant difference among the Myopic and Emmetropic subjects with regard to Vergence Facility, Independent Sample t-test was applied. The results are shown in the Table 4.

From the Table-IV, the t-value confirms the significant difference observed between Myopia and Emmetropic subjects with respect to Vergence Facility. This shows that

Vergence Facility was observed as significantly lesser in Myopic patients than Emmetropic subjects.

4. Discussion

Accommodation is the ability of the eye to change focus from one object to another and to maintain a clear focus on the object. Myopia has been found to have abnormal amplitude of accommodation and an abnormal response to blur. There is a low ability to accommodate through minus lenses, it seems that accommodative facility can be reduced, at least for part of the facility of the cycle.[5] Accommodative Facility evaluates the speed of accommodative step response. Patients with a history of headache, blurring of vision and asthenopia symptoms often have low flipper rates (accommodative infacility) and inadequate accommodation [accommodative insufficiency]. In normal binocular vision, accommodation and vergence co-operate to place on the fovea of each eye a sharp and clear image of the object of regard.

This study determines that there is a depression of the accommodative and vergence response in myopic adults in comparison to the response of emmetropic subjects. In myopic subjects, the accommodative responsiveness to both positive and negative lens defocus is slow when compared to emmetropes, Therefore the result was similar to a study done by O'Leary and Allen et.al resulted that myopes have lower accommodative distance facilities in comparison to emmetropia.[6] Radha krishnan et.al suggested that the presence of mid-spatial frequencies on the retina denies the need for the accommodative response.[7]

5. Conclusions

A reduced accommodative facility and vergence facility was found in myopes in comparison to emmetropia. At both distance and near, the mean facility was less for myopic eyes in comparison with emmetropic eyes.

6. Conflict of Interest

None.

7. Source of Funding

None.

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