



FINDING A BALANCE-CLINICAL PROFILE, STEREOPSIS AND AMBLYOPIA IN ANISOMETROPIA

Ophthalmology

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ABSTRACT

Introduction:- To investigate anisometropia and its association with amblyopia, stereopsis and strabismus in children from age 4 years to 20 years. **Materials And Method:-** This is a prospective study, wherein 55 cases of anisometropia who presented to outpatient department of ophthalmology in our tertiary eye care government hospital during 12 months period were studied. Patterns of anisometropia and association between anisometropia with stereopsis, amblyopia and strabismus were analyzed. **Results:-** Among 55 patients, males were (55%) and females were (45%). 28(51%) were <10 years and 27(49 %) were >10 years of age. Prevalence of high myopia-2 (3.63%), high hyperopia-5(9.09%), myopic astigmatism-31 (56.3%), hyperopic astigmatism-8 (14.5%), mixed astigmatism-2(3.63%) were noted. Difference of power between two eyes were divided into 3 groups i.e., <3D, 3-6D and >6D. Among 55 patients; majority were in first group i.e., 34 (61.8%). In first group around 70% patients had high to very high refractive errors but with difference of <3D in both the eyes with low stereopsis. Patients having refractive power in only one eye were 7(12.72%), presented after 10 years of age, had low stereopsis and strabismus. 15 eyes out of the 110(13%) had amblyopia. Most among them had high myopic astigmatism. **Conclusion:-** Myopic astigmatism and anisometropia are the major causes for low vision. Uncorrected anisometropia can lead to amblyopia and strabismus. Early detection and adequate treatment becomes imperative. Patient education, simple spectacle prescription and usage can reduce the burden of low vision and blindness in the community.

KEYWORDS

Anisometropia, Amblyopia, Stereopsis, Strabismus, Astigmatism.

INTRODUCTION

The optical state with equal refraction in the two eyes is termed as isometropia. When the total refraction of the two eyes is unequal, by more than or equal to 1D the condition is called anisometropia. It is a major cause for low vision in the population. Anisometropia if not treated early can lead to amblyopia and strabismus in later life. Risk of amblyopia is about twice as great in hyperopic than myopic anisometropes of comparable refractive imbalance. For a given degree of refractive imbalance, strabismic anisometropes perform considerably worse than anisometropes without strabismus. This study was done to determine the associations of anisometropia with amblyopia, stereopsis and strabismus.

Objectives:

- 1) To study the patterns of anisometropia.
- 2) To describe, if any, association between anisometropia with loss of stereopsis, amblyopia and strabismus.

Inclusion Criteria:

- Subjects from 4-20 years of age diagnosed with a refractive error (myopia / hyperopia / astigmatism) with difference of 1D or more between both eyes with normal anterior segment.

Exclusion Criteria:

- Any retinal diseases, previous ocular surgeries being the reason for difference in refractive error.
- Subjects with intellectual disability unable to comprehend the tests.
- Subjects/Parents not giving consent for the inclusion.

MATERIALS AND METHODS:

This is a prospective study conducted at a tertiary eye care government hospital. Duration of the study was 12 months. After fulfilling the inclusion & exclusion criteria, 55 subjects were enrolled. The demographic details like name, age, gender, address were noted. Detailed history regarding reason for seeking medical advice, history of spectacle usage, ocular surgery, any previous glass prescriptions were documented. Any hurdles for not seeking or following ophthalmic advice, usage of spectacles was asked for. All were subjected to detailed ophthalmic evaluation. Visual acuity (uncorrected and best corrected), Automated refractometer reading, Stereopsis, Cycloplegic refraction, Axial length by A scan, Slitlamp examination, Fundus examination with indirect ophthalmoscopy were performed and documented.

(elder children) or homide or cyclopentolate or atropine (younger children) followed by a thorough fundus examination. During refraction, both spherical and cylindrical power were checked, the axis of any cylindrical component can be classified as with-the-rule if the minus cylinder axis was within 150 of 180, against-the-rule for minus cylinder within 150 of 90, or oblique (i.e., other than with-or against-the-rule). The degree of anisometropia was expressed in spherical equivalents.

Children younger than 6yrs underwent cycloplegia with homide 1% eye drops or atropine 1 % eye ointment. In older children with no neurological abnormality 1% cyclopentolate drops was used: two drops with 5-minute interval 30 minutes prior to retinoscopy. For adults with tropicamide and phenylephrine instilled 45 minutes prior to examination. Patients were called for post mydriatic test and prescribed spectacles. Patients were also given amblyopia treatment like patching of normal or near normal eye, frosted glasses, atropine instillation if needed. Patient was then asked for review every 3 months to look for improvement in visual acuity and stereopsis.

Analysis of the data was done based on the documentation. Demographic distribution and characteristics were analysed. Patterns of anisometropia and association between anisometropia with stereopsis, amblyopia and strabismus were analysed.

RESULTS:

In our study group of 55 patients, 28(51%) were <10 years and 27(49 %) were >10 years of age (FIGURE 1). We had 30(55%)males and 25(45%)females(FIGURE 2).

Distribution of the refractive errors in our study group were as follows; High Myopia - 2 (3.63%), High Hyperopia -5(9.09%), Myopic Astigmatism-31 (56.3%), Hyperopic Astigmatism-8 (14.5%), Mixed Astigmatism-2(3.63%)(TABLE 1). Myopic astigmatism was the most frequently encountered refractive error among the study group.

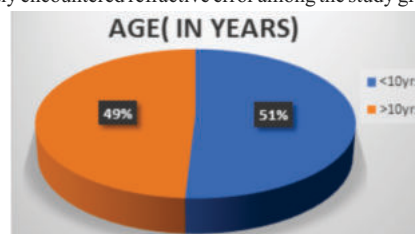


Figure 1- Graphical Representation Of Age Distribution

Refraction was carried out with tropicamide and phenylephrine

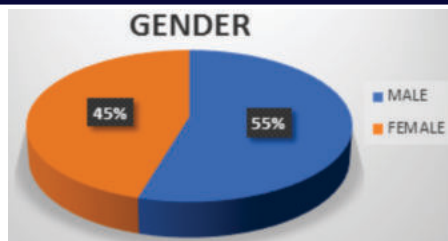


Figure 2- Graphical Representation Of Gender Distribution

Table 1 - Distribution Of Prevalence Of Anisomeropia.

Anisomeropia	Percentage Distribution
High Myopia	4%
High Hyperopia	10%
Mixed Astigmatism	4%
Myopic Astigmatism	67%
Hyperopic Astigmatism	15%

The study group was divided into three groups based on the intereye difference of spherical equivalent. i.e., <3D, 3-6D and >6D. Among 55 patients; majority were in first group i.e., 34 (61.8%). In first group around 70% patients had high to very high refractive errors but with difference was less than 3D with low stereopsis. There were 19 subjects with an intereye difference of 3-6D and 2 with an intereye difference of more than 6 D (TABLE 2).

Table 2 - Distribution Of Difference Of Power Between Two Eyes

Difference Of Power Between Two Eyes	Percentage Distribution
<3d	62%
3-6d	34%
>6d	4%

7(12.72%) patients had refractive power in only one eye and fellow eye being emmetropic. All of them were over 10 years of age, had stereopsis less than 200 secs and strabismus. 15 eyes out of the 110(13%) had amblyopia. Most among them had high myopic astigmatism.

DISCUSSION:

This study had almost equal number of subjects across gender and age groups. 7 subjects had refractive error in one eye with emmetropia in the fellow eye. As the children or parents did not notice that one eye had blurred vision, they did not seek ophthalmic care. 4 of them were referred for assessment after screening at school. The child realised the blurriness in one eye only when fellow eye was occluded during vision testing. Thus school screening cannot be overemphasized. 1 child sought ophthalmic help only when his emmetropic eye had an injury and refractive error with anisometropia was incidental finding. A Single preschool ophthalmic checkup can also detect such errors and can play an important role in reducing the prevalence.

A few longitudinal studies showed that anisometropia increases after children start school. A study in Japan found a small increase in the prevalence of spherical anisometropia (spherical difference ≥ 1.00 D), rising from 1.43% at 6 years to 3.14% at 11 years.¹ In addition, a similar increase in the prevalence of astigmatic anisometropia (cylinder difference ≥ 1.00 D), from 2.6% at 6 years to 4.3% at 11 years, was also found in that study.¹ Two other longitudinal studies in more myopic school children found larger increases (6% and 10% increase, respectively) in the prevalence of anisometropia after 3 years of follow-up.^{2,3,4}

This Study group had higher incidence of myopic anisometropia followed by hyperopic astigmatism. Singaporean population based study also had high prevalence of anisometropia in myopes compared to emmetropes and hyperopes.³

We found around 13% subjects having amblyopia. Intereye difference of 3D was found in up to 60% patients with amblyopia. High myopia along with anisometropia was probably causative. Studies examining the association of anisometropia and amblyopia in young children found a significant association between the two⁵⁻⁹ with a low prevalence of amblyopia overall (1.5%-2.6%).^{5,7-9} and part of it (24% ~37%) due to anisometropia.^{6,8} These studies were population based prevalence studies done on large number of school students. Our study

had equal number of subjects above 10 yrs. Delay in adequate spectacle correction and regular follow up has contributed to increased amblyopia and poor stereopsis.

CONCLUSION:

The prevalence of anisometropia increases between 5 and 15 years, when some children's eyes grow longer and become myopic. However, anisometropia was found to accompany both myopia and hyperopia, suggesting that other mechanisms in addition to excessive eye growth may exist for anisometropia development, especially in hyperopia. Myopic astigmatism and anisometropia are the major causes for low vision. Uncorrected anisometropia can lead to amblyopia and strabismus. Early detection and adequate treatment becomes imperative. Preschool ophthalmic screening is worth recommending for all children especially with family history of refractive error and strabismus. Patient education, simple spectacle prescription and regular usage can reduce the burden of low vision and blindness in the community.

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