

**Association between Refractive Errors & Amblyopia in 5-15 Year Children: A Study at Tertiary Care Center in Gujarat****Hardik Patel<sup>1</sup>, Geetika Srivastava<sup>2</sup>, Aruna Gupta<sup>3</sup>, Harpal Singh B. Jhala<sup>4</sup>**<sup>1</sup>Senior Resident, Narendra Modi Medical College, Ahmedabad, Gujarat<sup>2</sup>Assistant Professor, Narendra Modi Medical College, Ahmedabad, Gujarat<sup>3</sup>Professor, C U Shah Medical College, Surendranagar, Gujarat<sup>4</sup>Professor, C U Shah Medical College, Surendranagar, Gujarat

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**Abstract****Introduction:** Refractive errors are not uncommon in children and if not treated properly may lead to decreased visual acuity. Amblyopia is also one of the common visual problem which may lead to permanent disability. Common causes for Amblyopia are refractive error and strabismus.**Methods:** A total of 2741 children aged between 5 and 15 years were included in this hospital-based, cross-sectional study. All the children underwent examinations like uncorrected and best corrected visual acuity, Slit lamp examination, direct ophthalmoscopy, cover test at far and near, cycloplegic, and subjective refractions. The diagnostic endpoint for amblyopia was a best corrected visual acuity (BCVA) of <6/9 or 2-line inter-ocular optotype acuity difference. Chi-Square test was done for statistical analysis.**Results:** Out of 2741 children examined 636 children were diagnosed with refractive error. The prevalence of Refractive error and Amblyopia was 23.20% (n=636) & 3.39% (n=93) respectively with insignificant gender variation (p-value>0.05). The average age of presentation was 11.58±2.78 years. In 38.7% cases age of presentation was 5-10 years while rest belonged to > 10 years of age. Maximum no of amblyopia was due to myopic astigmatism {58.06% (n=54)}, Hypermetropic astigmatism 25.80% (n=24) followed by Myopia {8.60% (n=8)} and least in Hypermetropia {7.52%% (n=7)}. Binocular amblyopia was more (67%) then unilateral amblyopia (33%).**Conclusion:** As per the finding of our study, refractive error is a major risk factor for amblyopia. It emphasizes the need for visual screening of young children and management of refractive amblyopia at appropriate time.**Keywords:** Refractive error, Amblyopia, Astigmatism, Myopia, Hypermetropia.

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**Introduction**

Amblyopia, is defined as a decrease in best corrected visual acuity (BCVA) in one or both eyes caused by either form deprivation or abnormal binocular interaction with no organic pathology .[1–3] It is a common in children and causes impacts on childhood and adulthood life.

[4] Amblyopia is a common visual problem in children and usually associated with refractive error and strabismus. It can also lead to permanent visual disability. Anisometropic, strabismic, meridional and ametropic amblyopia are different types of amblyopia. Anisometropia is a common

cause of amblyopia and in this type of amblyopia the refractive power of both eyes is different.

In strabismic amblyopia, is also a common type of amblyopia and eyes will be having esotropia or exotropia and because of that both eyes fail to focus on an object.

Amblyopia is treated with glasses, lenses or sometimes patching of normal eye is needed to overcome. Prognosis of amblyopia treatment depends on the age at which disease is diagnosed and treatment begins. Amblyopia causes impact on academic level, social interaction, psychological and economic development.[5,6]

Earlier detection of children with amblyopia is helpful in treatment and also prevents further worsening.

The current study was conducted to assess the association between refractive error and amblyopia in 5-15 year children in tertiary care center of Gujarat.

### Material & Method

A Cross Sectional Study of children between 5 to 15 years of age was carried out at tertiary care center during August 2020 to July 2021.

**Inclusion Criteria:-** All the children between 5 to 15 years of age group

presenting to ophthalmology OPD of tertiary care center.

### Exclusion Criteria:

1. Patient with age <5 years and age >15 years.
2. Patient with History of premature birth,
3. Presence of any developmental delay or neurological disease,
4. Presence of systemic disease or ocular disease were excluded from the study

All the children diagnosed with refractive error underwent detailed ophthalmic examination uncorrected and corrected visual acuity, Slit lamp examination, direct ophthalmoscopy, cover test at far and near, cycloplegic, and subjective refractions. The diagnostic endpoint was a best corrected visual acuity of <6/9 or 2 line inter-ocular optotype acuity difference. Chi-Square test was done for statistical analysis.

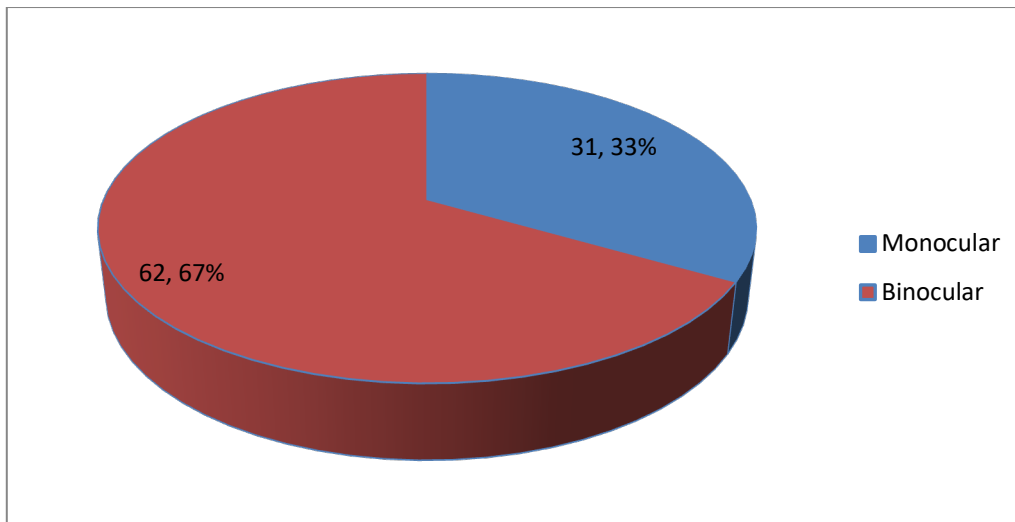
### Results

Out of 93 Amblyopic Children 45 were Males & 48 were Females. Results from this study clearly depicts that the type of amblyopia was independent of gender. The average age of presentation was  $11.58 \pm 2.78$  years. In 38.7% cases were in between 5-10 years while rest belonged to > 10 years. [Table 1]

**Table 1: Age & Gender wise Distribution according to Patients**

Age (Years)	Male	Female	Total
5-6	3	6	9
7-8	4	2	6
9-10	9	12	21
11-12	11	7	18
13-15	18	21	39
Total	45 (48.38%)	48 (51.61%)	93(100%)

Out of 93 Children two third of children having Binocular Amblyopia, while one third having Monocular Amblyopia. Binocular amblyopia was more (67%) then unilateral amblyopia (33%). (figure1)



**Figure 1: Laterality of Amblyopia**

Out of 93 children maximum patients 51.61% (n= 48) were with visual acuity between 6/18-6/60 and this was same for Right eye and Left eye ( Table 2)

**Table 2: Visual Acuity in Amblyopic Eye**

BCVA (Right Eye)	Number	Percentage
Better than 6/18	42	45.16%
6/18-6/60	48	51.61%
< 6/60	3	3.22%
BCVA (Left Eye)	Number	Percentage
Better than 6/18	41	44.08%
6/18-6/60	48	51.61%
<6/60	4	4.30%

**Table 3: Association of Refractive Error & Amblyopia**

Sr. No.	Types of Refractive Error	No. of Children	Percentage
1	Myopic Astigmatism	54	58.06%
2	Hypermetropic Astigmatism	24	25.80%
3	Myopia	8	8.60%
4	Hypermetropia	7	7.52%

Maximum no of Amblyopia was due to myopic astigmatism 58.06% (n=54), Hypermetropic astigmatism 25.80% (n=24) followed by Myopia 8.60% (n=8). (table 3)

**Discussion**

Early diagnosis of the refractive error has usually been the key to treat and prevent amblyopia progression. Various study have concluded that if amblyopia is diagnosed at early stage then it leads to good outcome as compared to those whose

treatment has been delayed. The presence of refractive error and strabismus are one of the two most common causative factors in the development of amblyopia. Zhu et al, concluded that uncorrected refractive error is more important factor than deviation.[7] Out of total 93, more than half of our patients (n=62) were suffering from amblyopia in both eye. 31 patients were having amblyopia in one eye. We analyzed the type of refractive error in amblyopic patients. Maximum number of amblyopia was due to myopic astigmatism

{58.06% (n=54)}, Hypermetropic astigmatism 25.02% (n=24) followed by Myopia {8.60% (n=8)} and least in Hypermetropia {7.52% (n=7)}.

Mocanu et al, conducted a study in Eastern Europe while few other studies that are conducted in Australian pediatric population found the similar results. They also concluded astigmatism as the most frequently occurring refractive error followed by hypermetropia in amblyopic patients.[8] Presence of astigmatism in the patients of strabismus was strongly linked with presence of amblyopia in these patients. Results of studies done by Robaei et al[9], and Shapira et al [10], have produced similar results. Astigmatism is a refractive error and may share common abnormality pathway with amblyopia. In one study by Faghihi et al[11] found that 27.8% of hyperopic and 3.7% of myopic cases were amblyopic. Refractive errors need a separate mode of management while strabismus needs separate management. However, both the conditions may aggravate the misery of the patient and can be disastrous if the pediatric patient grows with both of these abnormalities simultaneously.

### Conclusion

As per the finding of our study, refractive error is a major risk factor for amblyopia. If refractive error is important to diagnosed and treated at early stage for good prognosis. Therefore, it emphasizes the need for visual screening of young children and management of refractive amblyopia at appropriate time.

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