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# Prevalence of Amblyopia and Patterns of Refractive Error in the Amblyopic in School Going Children -A Prospective Study

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**KEYWORDS**

Amblyopia, Pattern, Prevalence, school going children

**ABSTRACT:**

**Background:** Aim of current study, the Prevalence of amblyopia and patterns of refractive error in the amblyopic in school going children

**Methods:** The prospective study was carried out at the Shri Aurobindo Medical Research Centre in Raipur, Chhattisgarh, India, in the department of ophthalmology. A study involving children aged 5 to 15 was carried out between April 2020 and May 2021.

**Results:** There were 830 pupils enrolled into this study, but only 67 (8.07%) met the criteria for amblyopia diagnosis. There were 38 males (56.71%) and 29 females (43.28%) students, The Mean age range was, males 7.87 ± 2.970 years, and female 7.97± 2.666. Refractive amblyopia accounted for 38 (56.71%) of cases of amblyopia, with strabismus 18 (26.86%), visual deprivation 7 (10.44%), and mixed or combined causes 4 (5.97%), the least common causes. Anisometropic amblyopia accounted for 29 instances (76.31%) and isometric amblyopia for 9 cases (23.68%) of refractive amblyopia. 53 cases (79.10%) had unilateral amblyopia, while 14 cases (20.89%) had bilateral amblyopia

**Conclusions:** According to current study, 8.07% of school going children had amblyopia. Nearly 38 (56.71%) of cases of amblyopia were of the most prevalent form, known as refractive amblyopia. It is advised to identify children who are at risk of developing amblyopia and to conduct routine eye exams on each kid at birth, when they first enter school, and at least every two years. In addition, parents to be made aware of refractive defects and the importance of having them corrected as soon as possible.

## 1. INTRODUCTION

Amblyopia, a Greek word meaning “blunt or blurry vision”, is defined as a reduction of best corrected visual acuity (BCVA) in one or both eyes caused by form deprivation or abnormal binocular interaction with no pathology in the visual system. [1,2] Typically, amblyopia occurs from infancy through age seven. It is the main reason why children's vision is declining. Lazy eye rarely affects both eyes at once. It is a prevalent issue in children [3] and affects a person's childhood and adult life as well as the community at large in a variety of ways. Academic achievement, profession choice, visuomotor abilities, social interaction, psychological development, and economic engagement are all significantly impacted by amblyopia. [4,5] Bilateral visual impairment is also more common in children with unilateral amblyopia. [6]

A significant public health issue that causes permanent visual impairment is amblyopia [7]. Amblyopia is frequently caused by refractive error [8,9,10]. Because parents are frequently unaware of refractive abnormalities in their children and receive late referrals for visual tests from ophthalmologists, the prevalence of amblyopia is sometimes underestimated [3–11]. Anisometropia, severe refractive errors and opacities of the ocular media, strabismus, or a combination of two or more aetiologies in the same patient are among the causes of amblyopia [12,13]. However, form deprivation in one or both eyes, or aberrant binocular interaction, is the fundamental process underlying amblyopia.

Lifelong vision impairment may result from failing to take corrective action in a timely manner (within the top limit of the critical time for Amblyopia development,

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which is eight years) [14,12]. In underdeveloped nations such as India, the primary causes of childhood blindness have been identified as vitamin A deficiency, trauma, cataract, and other related disorders resulting from malnourishment, infection, refractive error, and ill health [7,14, 15]. Children with developmental delays, early births, and a family history of amblyopia are more likely to experience amblyopia. Amblyopia should be diagnosed and treated as soon as possible.

Aim of current study, the Prevalence of amblyopia and patterns of refractive error in the amblyopic in school going children

## 2. METHODS

The prospective study was carried out at the Shri Aurobindo Medical Research Centre in Raipur, Chhattisgarh, India, in the department of ophthalmology. A study involving children aged 5 to 15 was carried out between April 2020 and May 2021. The patient guardian observed that each child had a thorough medical history concerning the age of onset. The Snellen vision chart was used to measure visual acuity; the auto-refractometer and streak retinoscope were used for cycloplegic refraction; slit lamp biomicroscopy was used to thoroughly examine the anterior segment; direct and indirect ophthalmoscopy was used to examine the posterior segment; the cover-uncover test was used to assess ocular motility.

The best corrected visual acuity in one or both eyes (6/12) or less than 6/12 in the absence of any organic lesion was the inclusion criterion for this investigation. Cases of trauma, a prior history of ocular surgery, and disorders affecting vision were excluded from the current investigation.

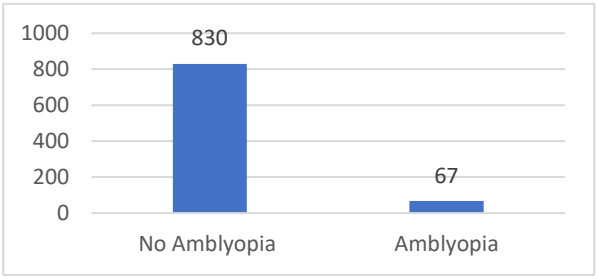
The criteria used for each subtype and diagnosis - Ametropic amblyopia is the term used to describe amblyopia linked to reduced visual input as a result of elevated refractive error. Participants exhibiting an interocular refractive error difference of ≥1 dioptre were classified with anisometropic amblyopia. Due to squinting, there were conflicting visual inputs between the eyes, resulting in strabismic amblyopia. The term "stimulus deprivation amblyopia" refers to amblyopia caused by a visual axis obstruction. A discrepancy in refractive error between the eyes, even as small as one dioptre, can result in anisometropic amblyopia.

To do additional statistical analysis, the IBM SPSS model 26 software was used to evaluate the records. Frequency and percentage, propose, variance, paired t-test, and frequency tables and graphs used to provide the records were utilized to do the descriptive evaluation. The locating determined to use crude and altered or with a 95% confidence c programming language. Were used to test for factors associated with Age related macular desgeneration and a P-value < .05 was considered statistically significant.

## 3. RESULTS

There were 830 pupils enrolled into this study, but only 67 (8.07%) met the criteria for amblyopia diagnosis. There were 38 males (56.71%) and 29 females (43.28%) students, The Mean age range was, males 7.87 ± 2.970 years, and female 7.97± 2.666.

Figure 1: Percentage of amblyopia




There was no significant difference in amblyopia prevalence between boys and girls ($P$ = 0.037). There was also no significant age trend evident in the study ($P$ = 0.123). Although amblyopia was more frequent 39 (58.20%) among pupils aged 4 to 8 Years compared to 9 to 12 years and 13 years to 15 Years 23 (34.32%), and 5 (7.46%) of pupils aged 4 to 8 all the types of amblyopia were significantly more common in children within the age group of 4-10 years ($P$ = 0.000). In the current study parents was not reported to have been treated for amblyopia previously. See table no.1.

Table no.1: Prevalence of amblyopia by age and sex

| Variables | Categories | Mean | SD | STD Error Mean | 95% Confidence Interval of the Difference | | T value |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Age Groups | Male(n-38) | 7.87 | 2.970 | 0.482 | 6.89 | 8.84 | 16.332 |
| | Female(n-29) | 7.97 | 2.666 | 0.495 | 6.95 | 8.98 | 16.092 |
| Boys Age Groups | 4-8 Years | 5.64 | 1.049 | 0.224 | 5.17 | 6.10 | 25.212 |
| | 9-12 Years | 6.09 | 5.255 | 1.120 | 3.76 | 8.42 | 5.437 |
| | 13-15 Years | 1.86 | 4.804 | 1.024 | -0.27 | 3.99 | 1.820 |
| Girls Age Groups | 4-8 Years | 4.64 | 2.735 | 0.583 | 3.42 | 5.85 | 7.951 |
| | 9-12 Years | 4.68 | 5.295 | 1.129 | 2.33 | 7.03 | 4.147 |
| | 13-15 Years | 1.18 | 3.825 | 0.816 | -0.51 | 2.88 | 1.449 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parents Educational Background** | **Primary** | 0.45 | 0.506 | 0.088 | 0.28 | 0.63 | 5.164 |
| | **Secondary** | 0.55 | 0.506 | 0.088 | 0.37 | 0.72 | 6.197 |
| | **Graduate** | 0.79 | 0.415 | 0.072 | 0.64 | 0.94 | 10.902 |
| | **Other** | 0.21 | 0.409 | 0.062 | 0.07 | 0.34 | 3.132 |

Refractive amblyopia accounted for 38 (56.71%) of cases of amblyopia, with strabismus 18 (26.86%), visual deprivation 7 (10.44%), and mixed or combined causes 4 (5.97%), the least common causes. Anisometropic amblyopia accounted for 29 instances (76.31%) and isometric amblyopia for 9 cases (23.68%) of refractive amblyopia. 53 cases (79.10%) had unilateral amblyopia, while 14 cases (20.89%) had bilateral amblyopia. The current study saw 0.45± 0.506 parents educational background from primary school pass, Secondary pass 0.55± 0.506, graduate pass 0.79± 0.415, and other educational background 0.21 ± 0.409, and 33 (49.25%) parents are from urban areas and 34 (50.74) parents are from rural areas. See table no.2.

Table no.2: Type of amblyopia.

| **Variables** | **N** | **%** | **Mean** | **SD** | **STD Error Mean** | **95% Confidence Interval of the Difference** | | **T value** |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **Refractive** | **38** | **56.71 %** | **0.97** | **0.160** | 0.026 | 0.92 | 1.03 | 38.000 |
| **Strabismus** | **18** | **26.86 %** | **0.46** | **0.505** | 0.081 | 0.30 | 0.63 | 5.707 |
| **Visual Deprivation** | **7** | **10.44 %** | **0.18** | **0.389** | 0.062 | 0.05 | 0.31 | 2.883 |
| **Mixed (Combined)** | **4** | **5.97%** | **0.10** | **0.307** | 0.049 | 0.00 | 0.20 | 2.084 |

## 4. DISCUSSION

The prevalence of amblyopia varies according to the age groups of the populations under study as well as the local conditions, such as the geography and the frequency of visual screening programs and the literacy rate. In the current study 67/830 (8.07%) prevalence. Amblyopia prevalence was found to be 1.1% in population-based regional studies conducted in India on the prevalence of refractive errors and childhood blindness [16]. A study conducted in India by Magdalene et al. also found that the prevalence was 1.75 percent. (17) In an additional Rahi et al.12.3% [18] research. K Anjaneyulu et al. 6.6% [20], and Murthy et al. 4.4% [19]. somewhat similar to the global rate of 1.75% [21], though not among the lowest. Rates varying around the global average were reported by Denmark 1.5% and 2.7% [22], Saudi Arabia 2.5% [23], China 1.47% [24], Romania 2.8% [25], Bulgaria 2.5% [26], Israel 1.2% [27], Malaysia 7.53% [28], and Brazil 0.81% [28].

The age of presentation of amblyopia in 4 to 8 years age group was more than other two age group. where male/female ratio was 44/20 for younger age group and 15/19 for older age group.[9] In current study, where the male amblyopia was 38 (56.71%) and female was 29 (43.28%). In current study, most common type of amblyopia is refractive out of which anisometropic amblyopia was the most common type of amblyopia which is comparable with Siamak Akbarzadeh et al.[29] , Yekta A et al. [30] , Preeti Bamhane et al. [31] and Jamali P et al. [32] study showed anisometropic amblyopia was significantly more common in patients with spherical hyperopic anisometropia compared to patients with spherical myopic anisometropia, cylindrical myopic anisometropia, and cylindrical hyperopic anisometropia. Reason behind Higher prevalence of anisometropic amblyopia than other type of amblyopia could be due to anisometropia being most common risk factors and usually children do not pay attention for unilateral refractive error for long time.

In current study, unilateral amblyopia was higher (79.10%) than bilateral amblyopia (20.89%), which is similar to the study done in Preeti Bamhane et al. [31] (80% unilateral amblyopia), and Mobina Mondal et al. [33] study showed Unilateral amblyopia was observed in 80.5%. If left untreated, paediatric amblyopia may result in monocular and binocular low vision with associated deterioration in quality-of-life indices in adulthood. [34,25,26] Therefore measures for early detection and dedicated rehabilitation of amblyopia should be a priority and also should be evidence-based.

## 5. CONCLUSION

According to current study, 8.07% of school going children had amblyopia. Nearly 38 (56.71%) of cases of amblyopia were of the most prevalent form, known as refractive amblyopia.

It is advised to identify children who are at risk of developing amblyopia and to conduct routine eye exams on each kid at birth, when they first enter school, and at least every two years. In addition, parents to be made aware of refractive defects and the importance of having them corrected as soon as possible.

Through media education, parents and kids can learn about the warning signs and symptoms of refractive defects as well as the dangers of going untreated. Additionally, school health programs should be developed, training teachers and other support staff members to evaluate their Children. Children whose vision is determined to be subnormal can be directed to facilities that offer refractive procedures. Lastly, school curricula ought to include instruction on and promotion of eye health. This will assist in introducing the kids to safe eye care procedures at a young age.

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**6. STRENGTHS AND LIMITATIONS**

It's a short-term and area-based study to study the long-term amblyopia and patterns of refractive error in the amblyopic in school going children.

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**9. CONFLICT OF INTEREST**- The authors declare that they need no conflict of interest.

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