



Evaluation of amblyopia in school going children

Dr. Pawan N Jarwal¹, Dr. Rekha Singh²

¹ Senior Resident Doctor, Department of Ophthalmology, Govt. R.D.B.P. Jaipuriya Hospital, Jaipur, Rajasthan, India

² Superintend & PMO, Department of Ophthalmology, Govt. R.D.B.P. Jaipuriya Hospital, Jaipur, Rajasthan, India

Abstract

Background and objective: Amblyopia is the most common cause of monocular vision loss in children and as amblyopia is a major preventable and treatable cause of pediatric low vision, early detection and treatment of amblyopia is very important to reduce the prevalence of amblyopia. This study was done to determine the prevalence of amblyopia in school going children in the age group of 5-15 years in and around Jaipur and also to detect the types of amblyopia in these children.

Materials and methods: Cross sectional and time bound study, in which 4020 school children in the age group of 5-15 years underwent screening. Amblyopia was diagnosed in eyes with reduced best corrected visual acuity in the absence of any other cause.

Results: Amblyopia was diagnosed in 44 children. Prevalence of amblyopia in our study was found to be 1.1 %. The underlying amblyogenic causes assessed were anisometropia (29.5%), strabismus (25%), combined mechanism amblyopia (15.9%), meridional amblyopia (13.6%), ametropic amblyopia (11.6%), and the least was that of visual deprivation amblyopia being 4.5%. No statistically significant associations were found in the geographical distribution, or in the gender distribution. The most frequent pattern of strabismus was exotropia. A higher percentage of moderate degree of amblyopia (64%) and more of unilateral cases of amblyopia (26) were detected. There were an equal number of hypermetropes and myopes, majority were given spectacle correction. All 44 amblyopes were prescribed occlusion therapy.

Conclusion: Prevalence of amblyopia was found to be 1.1% in our study. The results indicate the importance of screening school going children for amblyopia and the importance of early detection and treatment.

Keywords: school screening, amblyopia, types of amblyopia

Introduction

Normal visual acuity lays the foundation for binocular single vision. When significant interruption of normal visual development occurs, then amblyopia is the term used to describe this diminution of vision.

Amblyopia poses an important socioeconomic problem, especially since the risk of the amblyopic patient becoming blind is significantly higher than in the general population¹. Amblyopia is avoidable and to a degree treatable and deserves the best attention of the ophthalmologist.

Amblyopia remains as one of the most confused areas of ophthalmology. Amblyopia screening and treatment are efficacious, but cost effectiveness remains a concern. Refractive correction alone may successfully treat anisometropic amblyopia in 25- 75 % of patients^[2].

Why should we screen children for amblyopia?

Amblyopia is one of the common causes of childhood visual impairment^[3, 4]. Children constitute 35-40% of the general population. Considering the fact that 30% of Indian blind lose their sight before the age of 20 years, the importance of early detection and treatment of visual impairment in children is obvious. School going children therefore, form an important

large target group 5 and school vision screening plays an important part in early detection of amblyopia and institution of appropriate therapy, which is of immense value towards preventing the development of lifelong visual morbidity.

Although, amblyopia is the most common cause of monocular vision loss in population under 40 years, accounting for more cases than trauma and all other causes combined⁷, there is only one study, WHO – NPCB Survey of 1986-89, which reflects the ocular morbidity in our country. According to this, the prevalence of ocular morbidity in our country is 27.9% of the general population. Refractive errors account for 14.12% and cataract for 7.68%. It is unfortunate that till date, despite the high prevalence, there are no studies available at the national level which can provide data regarding ocular morbidity due to amblyopia. This study is a small step towards finding the prevalence of amblyopia in and around our region.

Aims and objective

1. To determine the prevalence of amblyopia in school going children in the age group of 5-15 years in and around Jaipur.
2. To study the types of amblyopia occurring during school years.

Materials and methods

Schools selected were eight rural schools and three urban schools. Age of the child was ascertained as per school records. Children who were absent on the day of ophthalmic examination were left out of the study. No follow up visits were done.

Sample size

Formula

$$N = \frac{4PQ}{E^2}$$

Where N= Sample size

P= Prevalence of positive character i.e. Amblyopia Q = 1-P
E = allowable error taken to be 1%

Therefore

$$\frac{4PQ}{E^2} = 3900$$

E2

Based on 80% power for a prevalence of 2.5% (average of 1-4%) 22 sample size calculated was 3900. At the end of our study, 4020 school going children underwent screening. So, the sample size of 4020 children was taken.

Amblyopia was defined as

A difference in the best corrected visual acuity (BCVA) between the two eyes of two or more Snellen lines. A best corrected visual acuity of less than or equal to 6/12 bilaterally on the Snellen’s fig. Standard definitions of different subtypes of amblyopia were used for diagnosis 24 the criteria used for the diagnosis are listed below:

Strabismic amblyopia: This was defined as amblyopia in the presence of a heterotropia at distance or near fixation, in the absence of any anisometropia, meeting the criteria of combined mechanism amblyopia.

Anisometropic amblyopia: This included patients who had amblyopia in the presence of anisometropia that was 1 D or greater in spherical equivalent, or a 1.5 D or greater difference in astigmatism between both the eyes that persisted for at least 4

weeks after spectacle correction, in the absence of any measurable heterotropia at distance or near.

Combined amblyopia: This included patients with either a heterotropia at distance or near along with anisometropia of 1 D or more in spherical equivalent or a 1.5 D or more difference in astigmatism in any meridian between both the eyes that persisted after at least 4 weeks of spectacle correction.

Sensory deprivation amblyopia: This group included patients with a known documented cause of sensory deprivation with no primary heterotropias or refractive errors that could be causally related to the amblyopia.

Ametropic amblyopia: Patients with refractive errors more than 1D spherical equivalent in both eyes resulting in subnormal vision in one or both eyes and not associated with strabismus or any other ocular pathology were classified under this category. Patients with significant anisometropia (as defined above) along with high refractive errors in both eyes were excluded from this category and were grouped under the anisometropic amblyopia group. Patients with heterotropias for distance or near with bilateral refractive errors more than 1 D spherical equivalent were included under strabismic amblyopia.

Meridional amblyopia: Patients with regular astigmatism 1.5 D of astigmatism in any meridian or those with irregular astigmatism in both eyes, resulting in a decrease in vision in one or both eyes and not associated with strabismus were classified as having Meridional amblyopia 28-29. Patients having significant anisometropia (as defined above) along with a difference of 1.5 D or greater astigmatism between the two eyes were excluded from this category and grouped under the anisometropic amblyopia group. Patients with heterotropias for distance and near with regular astigmatism more than 1.5 D in any meridian or irregular astigmatism were included under strabismic amblyopia.

Grading of amblyopia

Moderate amblyopia: Visual acuity of less than or equal to 6/12 to 6/24

Severe amblyopia: Visual acuity of less than or equal to 6/36

Inclusion criteria: School going children in the age group 5 to 15 years.

Exclusion criteria: School going children aged less than 5 years and more than 15 years. Data was analyzed using Chi-square test. Statistical Software used was SPSS version 17 (Statistical package for Social Science) and MS-Excel. P<0.05 was considered to be statistically significant

Result

Table 1

Sl. No	School	Boys	Girls	Total	Amblyopes Boys	Amblyopes Girls	Total amblyopes
1.	A	175	188	363	4	1	5
2	B	305	200	505	3	1	4
3	C	280	243	523	4	2	6
4	D	83	102	185	0	3	3
5	E	45	63	108	3	0	3
6	F	30	34	64	1	0	1
7	G	0	117	117	0	2	2

8	H	215	238	453	3	1	4
9	I	608	478	1086	6	3	9
10	J	149	79	228	1	2	3
11	K	215	173	388	0	4	4
Total		2105	1915	4020	25	19	44

Observation: Out of the 4020 students screened, 44 were detected as amblyopes

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Table 2: Prevalence of amblyopia among students

Total no. of students	Total Amblyopes	Prevalence (%)
4020	44	1.1

Prevalence of amblyopia was found to be 1.1% in our study. 44 had amblyopia of the total 4020 children screened

Table 3: Comparison of amblyopia among rural and urban students

Total no. of amblyopes	Rural amblyopes	Urban amblyopes
44	28	16

Number of amblyopes among rural students was more compared to urban students.

Table 4: Gender distributions of amblyopes

Total no. of amblyopes	Boys	Girls
44	25	19

A higher percentage of amblyopes were boys as compared to females.

Table 5: Types of Amblyopia

Sl. No	Type of amblyopia	Prevalence (%)
1	Strabismic	11 (25%)
2	Anisometropic	13 (29.5%)
3	Combined	7 (15.9%)
4	Meridional	6 (13.6%)
5	Ametropic	5 (11.4%)
6	Visual deprivation	2(4.5%)

A higher percentage of anisometropic amblyopia (29.5%) was seen in our study.

Table 6: Types of strabismus

Exotropia	Esotropia
10	8

A higher percentage of exotropes (55%) were found in our study as compared to esotrope

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Exotropia	Esotropia
10	8

A higher percentage of exotropes(55%) were found in our study as compared to esotropes

Table 8: Laterality of amblyopia

Unilateral	Bilateral
26	18

More number of unilateral amblyopes were seen as compared to bilateral amblyopes in our study.

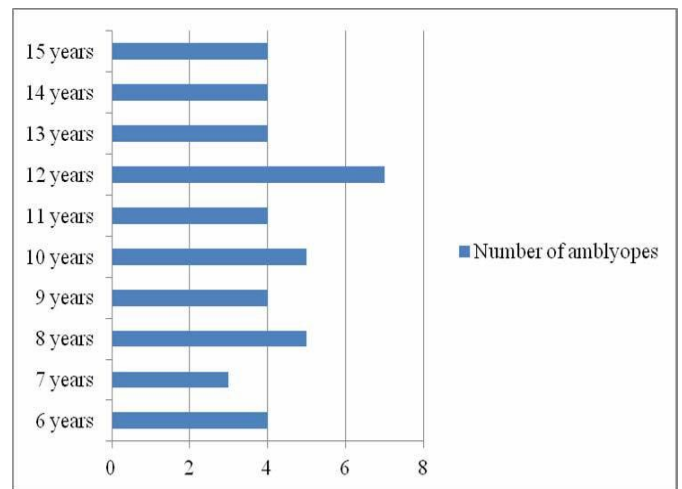


Fig 1: Age wise distribution of amblyopia

More number of amblyopes was detected in the 12 year old age group in our study.

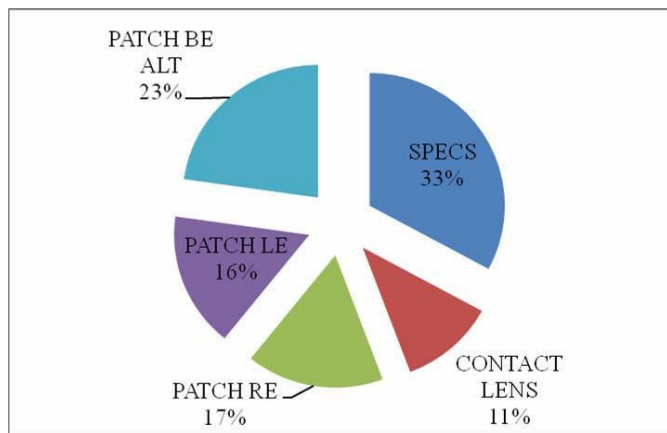


Fig 2: Treatment modalities prescribed to amblyopes

Majority of them were prescribed spectacles correction. Occlusion therapy was advised to all, 16% were advised to occlude left eye, 17% patching right eye and 23% were advised patching both eyes alternatively for six hours.

Discussion

The prevalence of amblyopia in urban children (0.9%) was found to be slightly lower than rural children (1.2%). This is comparable to the Goel *et al.* study 58 which found an incidence of amblyopia to be less than one percent in school children and the incidence was higher in rural schools (0.7%) than urban schools (0.5%) at the primary level. A study of refractive errors prevalent in an urban population of India reported the prevalence of amblyopia to be 4.4% 59 A similar study done on a rural population base reported it to be about 12%.60 The higher prevalence of amblyopia in rural children is probably because of the lack of awareness about regular eye check up and the importance of spectacles use amongst the rural population. The prevalence of amblyopia between the rural school children (1.2%) and the urban school children (0.9%) was compared, the results statistically analyzed using chi - square test and it was found to be statistically insignificant (p value-0.5137).

Prevalence of amblyopia was compared between the two genders, which showed a slightly higher prevalence in boys (1.1%) as compared to the girls (1%). Results were statistically insignificant (p value-0.6576).

In our study, we found a higher prevalence of anisometropic amblyopia (29.5%) when compared to strabismic amblyopia (25%) that was comparable to Shah *et al.* Study, 61 which reported a higher prevalence of anisometropic amblyopia (43%) compared to 37% of strabismic amblyopia in Pakistani children in the age group of 3-14 years. Similarly, in the Attebol *et al.* study62 done on adult population, prevalence of anisometropic amblyopia (50%) was found to be higher when compared to strabismic amblyopia (19%) However, there are reports of the prevalence of strabismic amblyopia to be higher than anisometropic amblyopia in younger age groups (< 7 years) 63-64 Prevalence of combined mechanism amblyopia was 15.9%, meridional amblyopia (13.6%), ametropic amblyopia (11.6%), and the least was that of visual deprivation amblyopia being 4.5%.

There was a higher prevalence of exotropia (56%) than esotropia

(44%) in our study. This can be compared to another south Indian study52 which also showed higher prevalence of exotropia (70%).

There were almost an equal number of myopes and hypermetropes. Six children had meridional amblyopia. Out of these, four had compound myopic astigmatism, one had compound hypermetropic astigmatism and one had mixed astigmatism.

A higher percentage of moderate degree of amblyopia (64%) was found as compared to 36% of severe degree of amblyopia. This might be because our study had more of anisometropic amblyopes as compared to strabismic amblyopes and strabismic amblyopia is associated with severe degree of amblyopia.

There were more unilateral cases of amblyopia [26] than bilateral cases of amblyopia [18]. In age wise classification of amblyopes, more number of amblyopes was detected in twelve year age group.

Target groups in our study were school going children. Among the treatment modalities prescribed, majority were given spectacle correction (33%) and only the high school and children who were highly motivated were given contact lens (11%). All the children diagnosed with amblyopia were counseled about occlusion therapy along with the parents and the need of compliance to occlusion therapy was stressed upon. All 44 amblyopes were prescribed occlusion therapy and for patients with ametropic amblyopia, patching of both eyes alternatively was prescribed to 23%. Patching was prescribed for 4 hours for moderate degree of amblyopia and for six hours for severe degree of amblyopia. The success of amblyopia therapy is highly dependent on compliance with appropriate treatment. Amblyopia management requires long term follow up. As this study is a time bound study, we did not include the evaluation of the management modalities as a part of our study.

Conclusion

Prevalence of amblyopia was found to be 1.1%. Majority of the amblyopes were boys and a greater prevalence of amblyopia was found in rural children, both of which, were statistically insignificant.

Anisometropic amblyopia was the commonest amblyopia (29.5%) and in strabismic amblyopia, exotropia was found to be more common. Depth of amblyopia was moderate degree in majority of the cases with unilateral amblyopia being more common than bilateral amblyopia. A higher number of amblyopes were detected in twelve year age group. There were an almost equal number of myopes and hypermetropes with spectacle correction being the most favored treatment modality. All the 44 amblyopes were put on occlusion therapy after counseling the parents and children.

To conclude, in this study factors like geographic distribution, gender distribution and age did not have any bearing on the prevalence of amblyopia. Majority of the children did not have any complaints at the time of screening. Screening programs in school children would detect not only amblyopia, but also the other amblyogenic factors like ametropias, strabismus and visual deprivation, the diagnosis and treatment of which in time will prevent amblyopia and subsequent visual loss.

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