

A Prospective, Observational Assessment of Amblyopia and its Risk Factors in Selected School Going Children

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Abstract

Aim: To study the prevalence of amblyopia in school going children.

Material & Methods: The present study was conducted as a prospective, observational study at the Department of Ophthalmology, Bhagwan Mahavir, Institute of Medical sciences, Pawapuri, Nalanda, Bihar, India, on 1000 school going children over a period of 1 year.

Results: About 42% cases belonged to lower socio- economic background. Among 33 amblyopic cases 13 cases (76.9%) showed improvement in >2 snellens line in visual acuity. The observed association between duration of occlusion therapy and visual improvement in children with amblyopia was statistically insignificant ($p>0.05$).

Conclusion: Amblyopia is one of the major hidden visual problems in the society which can be prevented by early identification and proper management in appropriate time. Early diagnosis and treatment can prevent and minimize risk of permanent deficit of vision in amblyopia if detected earlier especially before 10 years of age. Screening programs in school going children can detect amblyogenic factors earlier to prevent major permanent deficit in vision by amblyopia so screening of children should be done through school surveys, awareness should be spread through various campaigns among the teachers and parents of the children about amblyopia and its adverse consequences not only on visual impairment part but also functional, psychological, social, economic impact.

Keywords: amblyopia, school going children, visual problem

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Introduction

Amblyopia is an important public health problem leading to visual impairment which is lifelong [1-3]. Refractive error is one of the common causes of amblyopia [4-6]. The prevalence of amblyopia is often underestimated due to lack of awareness and knowledge in parents about refractive errors in children and late ophthalmological referrals for visual

screenings [7-9]. The causes of amblyopia include anisometropia, high refractive errors and opacities of the ocular media, strabismus or a combination of two or more aetiologies in the same case [10-12].

Amblyopia was not associated with LBW, preterm birth, maternal age, or maternal smoking during pregnancy in the

Strabismus, Amblyopia, and Refractive Error in Young Singaporean Children (STARS) Study [13] and the Sydney Pediatric Eye Disease Study (SPEDS). [14] Factors such as maternal smoking, drugs, and alcohol use during pregnancy may be associated with an increased risk of amblyopia. [15-16]

In Vision 2020, amblyopia is a major preventable and treatable cause of low vision in pediatric age group. If not treated at appropriate time, pediatric amblyopia can result into monocular and binocular low vision with associated deterioration in Quality-of-Life indices in adulthood. Therefore, it should be a priority to take measures for early detection and dedicated rehabilitation of amblyopia. This should be the hallmark of the blindness control programme in India. So present study was carried out to assess the magnitude of amblyopia and its associated risk factors in school going children of Bihar region.

Material & Methods:

The present study was conducted as a prospective, observational study at the Department of Ophthalmology, Bhagwan Mahavir, Institute of Medical sciences, Pawapuri, Nalanda, Bihar, India, on 1000 school going children over a period of 1 year. All the school going children between 5-16 years of age in a radius of 3km around Hospital were included whereas children with anterior segment or posterior segment abnormality; any congenital ocular anomaly other than congenital cataract and ptosis and with

history of ocular trauma or any ocular surgery were excluded.

After obtaining ethical clearance from Institute's ethical committee, written consent was taken from all the parents of children. Permission for screening of children on particular date was taken from the respective school principal. All the children fulfilling the inclusion criteria were screened and examined during school visit.

Detailed sociodemographic history pertaining to age, gender, and socioeconomic status was obtained using questionnaire. Visual acuity of all the children of age group 5-16 years was checked on distant Snellens visual acuity chart then torch light examination of anterior segment and direct and indirect ophthalmoscopy for fundus examination was done.

A total of 50 cases of amblyopia detected and all of them were studied in detail. The presenting complaints were recorded in chronological order and detailed history of presenting illness was taken. Past history of any ocular trauma or ocular surgery or infection taken. Any history of similar illness in family members was asked.

Then ocular examination for amblyopia was done under following headings:

1. Visual acuity
2. Head posture
3. Ocular movements
4. Anterior segment
5. Fundus examination
6. Hirschberg test

Position of corneal reflex	Angle of deviation
1. On the margin of pupil	15 degree
2. Halfway between pupillary margin and limbus	25 degree
3. On the limbus	45 degree

Alternate and cover/uncover test- to detect heterotropia and heterophoria. These tests were performed both for near and distance fixation.

Prism Bar Cover Test- angle of deviation

Retinoscopy- For retinoscopy cyclopentolate 1% eye drop was instilled in each eye and repeated in every 15 min for 60 minutes till full mydriasis.

Refraction was done after retinoscopy. First dry retinoscopy was done and immediate acceptance was noted then wet retinoscopy was done after instilling 1 % cyclopentolate eye drop and glasses were prescribed after 3 days (post mydriatic test). Refractive correction was given to those children who had refractive error during school visit after being called in eye OPD and also to children with amblyopia as one of the management procedures. The amblyopic patients were treated by optical correction with glasses, occlusion and by operative intervention like surgery for strabismus and ptosis.

Patching was done using micropore eye patch according to following schedule-

1. Mild amblyopia – 2 hourly patching of normal eye with constant near work.
2. Moderate/severe amblyopia – 4 hourly or 6 hourly patching of normal eye with constant near work.

All the children were followed up after 1 month, 3 months and 6 months. Visual improvement was tested on each follow up visit by Snellen's distant visual acuity chart.

Statistical analysis: Data was compiled using MS Excel and analysed using IBM SPSS software version 20. Data was grouped and expressed as proportions. Chi square test was used to assess the association between proportions and p value of less than 0.05 was considered statistically significant.

Results:

A total of 1000 children were screened between the age range of 5 and 16 years.

40.4% children were 9-12 years of age and among them 52.5% were male and 47.5% were female. [Table 1] In present study, 30 children had amblyopia (2.5%). [Figure 1] Males comprises of 57.58% cases. About 42% cases belonged to lower socio-economic background. [Table 2] Anisometropia was the most predominant risk factor associated with amblyopia (51.2%). Anisometric amblyopia was most common (57.5%). Maximum patients had unilateral (90.9%) and moderate amblyopia (48.4%). [Table 3] Among 33 amblyopic cases 13 cases (76.9%) showed improvement in >2 snellens line in visual acuity. The observed association between duration of occlusion therapy and visual improvement in children with amblyopia was statistically insignificant ($p > 0.05$). [Table 4]

Table 1: Distribution according to sociodemographic variables of children screened

Sociodemographic variables		Number of Children	%
Age group (years)	5-8 years	264	26.4
	9-12 years	404	40.4
	13-16 years	332	33.2
Gender	Male	525	52.5
	Female	475	47.5

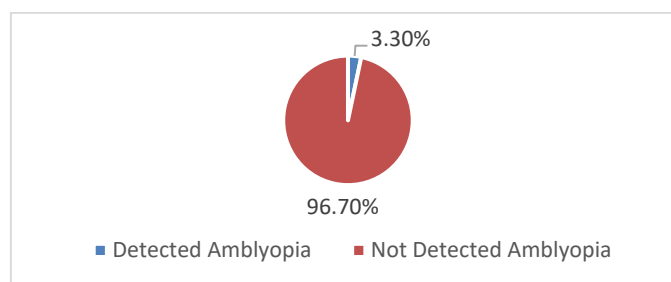


Figure 1: Prevalence of amblyopia in school going children

Table 2: Distribution of children with amblyopia according to sociodemographic variables

		Number of cases (n=33)	Percentage (%)
Age group (years)	5-7	10	30.3
	8-10	9	27.27
	11-13	10	30.3
	14-16	6	18.18
Gender	Male	19	57.58
	Female	14	42.42
Socioeconomic status	Upper class	2	6.061
	Upper middle	2	6.061
	Lower middle	5	15.15
	Upper lower	7	21.21
	Lower	14	42.42

Table 3: Distribution according to Risk factors and Characteristics of amblyopia

Characteristics of amblyopia		Number of cases (n=30)	Percentage (%)	
Risk factors	Anisometropia	17	51.52	
	Myopia	2	6.061	
	Hypermetropia	4	12.12	
	Astigmatism	1	3.03	
	Strabismus	6	18.18	
	Ptosis	1	3.03	
	Congenital cataract (blue dot)	1	3.03	
	Anisometropic	19	57.58	
	Ametropic	4	12.12	
Type of amblyopia	Meridional	1	3.03	
	Strabismic	5	15.15	
	Sensory deprivation	2	6.061	
Laterality	Bilateral	7	21.21	
	Unilateral	30	90.91	
Grading	Mild	6/24-6/12	11	33.33
	Moderate	6/60-6/36	16	48.48
	Severe	< 6/60	3	9.091
Refractive error	Myopia	9	27.27	
	Hypermetropia	17	51.52	
	Astigmatism	6	18.18	
Squint	Esotropia	1	3.03	
	Exotropia	3	9.091	

Table 4: Distribution of amblyopic cases in accordance with effect of duration of occlusion therapy on visual improvement

Duration of patching	Amblyopia grading	Number of cases with >2 snellens line improvement	Percentage (%)
2 hours	13 (mild)	10	76.9
4 hours	15 (moderate)	11	73.3
6 hours	5 (severe)	1	20
χ^2		3.6	
P value	0.24		

Discussion:

Vision screening in children is recommended for detection of potentially treatable disorders [17-18]. In a large population country with moderate resources like Egypt, lack of early eye care services for preschoolers makes the selected age group of our study (8–12 years old); ideal for screening because of their mandatory presence at schools at regular basis, reliable responses, and possible treatment of discovered amblyopia as proven by recent research[19].

The prevalence of amblyopia in our study is consistent with international results [17]. It is very comparable to regional developing countries like Saudi Arabia (1.85% in 6–12 years children) [20] and Central China (2.16% in primary school children) with nearly similar prevalence of severe amblyopia to ours (36% and 42%, resp.) [21]. It is also quite similar to developed countries as Sweden where prevalence of deep amblyopia ($VA \leq 0.3$) is 2%, reduced to 0.2% with treatment [22].

In our study, amblyopia was higher in males than females. This was similar to the study of Gupta et al [23] and Jarwal et al [24] in which slight male predominance was observed for amblyopia. An explanation for this gender discrepancy may be due to the bias that fewer girls report to hospitals and schools especially in rural areas and higher male female ratio in general population.

Amblyopia was more common in children with lower socioeconomic background in our study. These findings were supported by findings of Ikuomenisan et al. [25] This could be probably due to illiteracy and lack of awareness of regular eye check-ups, the importance of using spectacles, less affordability for hospital reach, ignorance of minor complaints, less or no advertisement to aware the population through electronic and print media about the amblyopia.

Even if anisometropia is optically corrected, anisokenia may be another amblyogenic factor for development of amblyopia [26]. Severity and prevalence of amblyopia increases as the amount of anisometropia increases [27-28]. Hypermetropic patients with anisometropia of one Diopter difference may have amblyopia, while myopic anisometropic usually do not have amblyopia until anisometropia is large [29]. Unilateral high hyperopia or myopia greater than 6 Diopter can cause severe amblyopia [30-32]. Isometric amblyopia (severe symmetric refractory errors) may cause mild to moderate bilateral amblyopia, more common in hyperops (in excess of +6 Diopter) than in myopes [30].

Conclusion:

Amblyopia is one of the major hidden visual problems in the society which can be prevented by early identification and proper management in appropriate time. Early diagnosis and treatment can prevent and minimize risk of permanent deficit of

vision in amblyopia if detected earlier especially before 10 years of age. Screening programs in school going children can detect amblyogenic factors earlier to prevent major permanent deficit in vision by amblyopia so screening of children should be done through school surveys, awareness should be spread through various campaigns among the teachers and parents of the children about amblyopia and its adverse consequences not only on visual impairment part but also functional, psychological, social, economic impact.

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