

Screening for Amblyopia in Children Attending the Tertiary Care Hospital in Uttarakhand

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Abstract

Topic_- Screening for amblyopia in children attending the tertiary care hospital in Uttarakhand, **Background:** Amblyopia needs timely intervention to preserve, and improve the presenting vision. The present study seeks to determine the prevalence of amblyopia and its distribution among children visiting a tertiary care hospital in Uttarakhand. **Material and Method:** The study was conducted in a tertiary care teaching hospital on children below twenty years of age. All children visiting the eye department were assessed for vision, and those found with difference of two or more lines between two eyes, or with vision less than 6/9 in either eye was screened out. These children were further evaluated to rule out any organic or pathological causes for decreased vision. Subjects with amblyopia were then classified into different categories as per their ocular parameters. **Results:** Out of 4280 cases screened, there were 138 cases of amblyopia. Females had more Amblyopia than male and the difference was statistically insignificant. The relation between Anisometropic, High Ametropic, Meridional Amblyopia were found to be statistically significant. **Conclusion:** This study is useful in comprehending the current visual status of children. It would also help in improvising screening programs and promote awareness.

Keywords: Amblyopia, children, screening, prevalence, awareness.

Introduction

Amblyopia is commonly termed as a 'Lazy Eye' where there is lack of normal functional ability without any pathology. This could be due to anatomical variation, or developmental anomaly that could lead to impaired binocular function if not timely treated. The prevalence of amblyopia has been reported to be 1% to 2% which shows that around 2 to 3 children in a group of 100 are likely to present with it.[1,2,3]The American Academy of Ophthalmology considers amblyopia an interocular difference of 2 lines or more in a visual acuity table (without specifying any), or visual acuity worse than or equal to 20/30 with the best optical correction.[4]

Amblyopia as an entity gives a critical period of intervention and correction. Beyond a certain age, it gets difficult to resolve it, with some amount remaining uncorrected for the rest of the time leading to loss of functional vision. In the current study, we screened children with amblyopia and studied their classification.

Material and Methods

The study design is a cross sectional, hospital-based study wherein the children visiting the hospital for routine check-up were included as participants. Children presenting with conditions related to ocular emergencies, or those in need for any medical or surgical intervention were excluded from the study. After an ethical clearance, a written and informed consent was obtained from the parent or guardian, for each eligible child. Basic demographic data was collected and a comprehensive ocular examination was conducted. The detailed examination included testing of the distance visual acuity (VA) of children more than 3 years of age, cycloplegic refraction, anterior segment and dilated fundus evaluation. The protocol for cycloplegia was administration of 2 drops of 1% cyclopentolate, instilled 5 minutes apart for three times. Automated retinoscopy was performed using Heine Retinoscope. Ocular alignment was evaluated using the Cover-Uncover test (CUT), Alternate Cover test (ACT), and Prism Bar Cover Test (PBCT). Hirschberg test was performed in cases of manifest squint, and the amount of deviation was confirmed with PBCT in prism diopters (PD). In Preverbal Children who cannot finish this task, the diagnosis can be made using Behavioral methods such as the Fixation preference by observing the vigor with which the child objects to occlusion of one eye relative to the other. Recognition of visual acuity testing based on Optotypes like letters, numbers or symbols was done as soon as the child could perform the task reliably.[5,6]

Anisometropia is a difference in the state of refraction of at least 1 diopter between 2eyes. The prevalence of anisometropic amblyopia is about 4.7% in children and may bemyopic,

astigmatic, or hypermetropic. The most common type of anisometropia seems to vary with the age, ethnicity, and ocular pathologies of the analyzed sample. [7,8]

Meridional Amblyopia refers to Selective deprivation of visual stimuli for certain spatial orientation. It is seen that 1.25D of astigmatism can cause Amblyopia. It occurs when a child progresses through that critical period of visual development with one visual meridian sharper than the other. High Ametropic Amblyopia is large, approximately equal, uncorrected refractive error in both eyes of a young child causes bilateral reduction in visual acuity that is relatively mild. Bilateral Amblyopia was categorized when a high degree of uncorrected ametropia, almost equal was noted in both eyes. We excluded stimulus deprivation and strabismic amblyopia as they needed a different approach of treatment besides amblyopia therapy. [9,10]

Statistical Analysis- SPSS was used to assess the data. A pValue less than 0.05 was suggestive of significance.

Results

Table 1:

- Prevalence of Amblyopia and Gender Distribution:

Out of 4280 patients screened, 2240 (58.28%) were males, and 2044 (47.7%) were females. Amblyopia was found in 138 cases giving a prevalence of 3.2%.

Out of 138 patients, 70 (51%) females and 67 (48 %) were males. Chi square Test showed there was no significant difference statistically between the number of males and females presenting with amblyopia.

Table 2:

- Laterality of Amblyopia:

Out of the 138 patients of Amblyopia, we found out that there were more cases of Unilateral amblyopia amounting to be 58 % and cases of Bilateral Amblyopia amounted to be 41 %. Chi square test showed that no statistically significant difference in between the number of patients presenting with amblyopia in one eye than the number of patients with amblyopia in both eyes (pValue=0.2)

Table 3:

- Prevalence of Meridional, Anisometropic and Ametropic Amblyopia:

Out of the 138 patients having Amblyopia, we found that Anisometropic Amblyopia was the commonest with 86 cases amounting to be 62 %. Ametropic Amblyopia was noted in 52 (37%) cases. Only 29 cases were of Meridional Amblyopia amounting to be 21 %. Spearman test results showed that the correlation between these 3 categories of classification was statistically significant with pValue=0.001.

Table 4:**Variation of Dioptric power according to the Age and Type of Amblyopia:**

Among the variation in dioptric power of the eye of 138 patients, the anisometric category showed a maximum range of 12D in myopic, 6D in hypermetropic amblyopia with an average age group 11.13 years. Among meridional cases, the maximum dioptric power recorded was 2D, with the average age group 11.13 years. In Ametropic Amblyopia Maximum Dioptric power noted was 11D in Myopic and 5D in Hypermetropic, with average age group to be 13.48 years.

This could suggest that a myopic eye is more functional in resisting amblyopia and can also overcome it to give more useful vision.

Presenting Best corrected Visual Acuity (BCVA) noted in Anisometric, Meridional and Ametropic was 6/9, 6/9 and 6/12 respectively.

The Presenting BCVA recorded to be lowest among amblyopic cases was 6/24, 6/12 and 6/36.

The relation between the variation of Dioptric power was statistically insignificant using Chi-Square test, with pValue to be 0.76.

Discussion

In the present study we found a prevalence of 3.2 % in the 4280 patients that we had studied.

A meta-analysis by Fu et al conducted on 60 studies (1 859 327 subjects) has shown that the pooled prevalence rate of amblyopia was 1.44% (95% CI 1.17% to 1.78%). Prevalence of Europe (2.90%), North America (2.41%) was found to be higher than of Asia (1.09%) or Africa (0.72%).[5] The results from the meta-analysis by Mostafaie et al has indicated a worldwide prevalence of 4.3%. According to the analysis of the subgroups based on the continent, America (5.57%) had the highest prevalence and Europe (4.57%), Asia (3.8%) and Africa (0.71%).[6]

The study by Chia et al from Singapore, the prevalence of amblyopia in children aged 30 to 72 months was 1.19%. [7] In a study from South India, out of 4020 school children aged between 5 and 15 years were screened in a population-based, cross-sectional study, the prevalence of amblyopia was estimated to be 1.1% No statistically significant difference was noted in the prevalence of amblyopia between rural (1.2%) and urban (0.9%) children (p = 0.5). [8]

In a cross-sectional study by Mondal et al, among 500 children between the ages of 5 to 15 years in Kolkata, the prevalence of amblyopia was found to be 11.4% (n=57). [9]

In our study we found amblyopia in males 67 (48%) And 70 (61%) in females, with ratio of females more than males. Statistically this difference was insignificant.

The meta-analysis by Fu et al found no difference in the prevalence between genders.[5] Chia et al also found no difference in gender in participants of amblyopia ($P = 0.22$).[7] In a study from South India, the number of boys with amblyopia ($n = 25, 57\%$) was found to be higher than the number of girls with amblyopia ($n = 19, 43\%$; $p = 0.6$) but the difference was statistically insignificant.[8]

The meta-analysis by Hue et al, revealed a significantly higher prevalence of amblyopia in boys (1.40%) than in females (1.24%) Nevertheless, they regarded that such gender was not a recognized risk factor for amblyopia and such differences call for further study.[9]

The age group with maximum amblyopia in our study was 11 to 15 years. Fu et al has reported a prevalence of 3.29% of amblyopia maximum among subjects more than 20 years old.[5] Mondal et al reported that all the types of amblyopia were more common within the age group of 5-10 years.[10]

Faghihi et al in a population-based study found that the lowest prevalence was 2.24% in the age group 5-15 years and the highest prevalence was 7.14% in the age group 55-65 years. They observed a group of 2739 individuals, of whom 65.6% were women with mean age of the participants being 29.5 ± 17.5 years.[11] This decrease of prevalence in younger age groups reflects the increased awareness in society in the present as compared to the decades earlier.

On Laterality of amblyopia - Out of the 138 patients of Amblyopia, we found out that there were more cases of Unilateral amblyopia amounting to be 58 % and cases of Bilateral Amblyopia amounted to be 41 %. Chia et al found Unilateral amblyopia (0.83%) was twice as frequent as bilateral amblyopia (0.36%), with Refractive Error being the most common cause noted in 85% cases.[7] Ganekal et al have attributed ametropia (50%), and anisometropia (40.9%) as common amblyogenic factors. [8]

Mondal et al have also reported that unilateral amblyopia significantly more as it was observed in 80.5% cases than bilateral (19.5%). Also, they observed that Refractive amblyopia (58.4%) was the most common type of amblyopia out of which anisometropic amblyopia accounted for 74.6%. [9]

Faghini et al have reported the prevalence of anisometropia in 45.24% as compared to a prevalence 24.6% of isometropia among amblyopic patients.[11]

Our study found that studies conducted on amblyopia are heterogenous in terms of the size of the sample. The denominator differs, so does the demography. Also, the studies we compared with were different in the cultures, and accessibility of health care. Despite the differences, the results were comparable, and worth gauging at.[12]

Conclusion

Studies like ours help to assess the milestones covered in removing needless causes of subnormal vision. They help us to guide in our path towards VISION 2020, and keep the

health personnels and the society informed and intelligent. The unique feature of the study is that it focuses on those amblyopic cases which can be corrected by occlusion therapy and other non-surgical methods unlike in strabismic and stimulus deprivation category of amblyopia. The present study highlights the age group that needs attention as it lies somewhat removed from the critical period of visual development, yet deserving a trial of therapy for amblyopia.

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Results-

Table 1:

Prevalence of Amblyopia and Gender Distribution:

Test used – Chi square test

Gender	Total cases	SQUINT		p value
		No	Yes	
		Frequency (%)	Frequency (%)	
F	70	37 (80.4%)	9 (19.6%)	0.920
M	67	43 (79.6%)	11 (20.4%)	
Total	138	80 (80.0%)	20 (20.0%)	

Table 2 :

Laterality Of Amblyopia :

Test used – Chi square test

Eye	SQUINT		p value
	No	Yes	
	Frequency (%)	Frequency (%)	
			0.284

B/L	11 (73.3%)	58 %	
U/L	23 (79.3%)	41 %	
Total	80 (80.0%)	138 (20.0%)	

Table 3:

Prevalence of Meridional, Anisometropic and Ametropic Amblyopia:

Spearman correlation between Hypermetropia, Myopia, Meridional with Age

Correlations			AGE
Spearman	RESPHERE	Correlation Coefficient	-0.164
		p value	0.072
		N	121
	R CYLINDERRE AXIS	Correlation Coefficient	-0.098
		p value	0.455
		N	60
	RE AXIS	Correlation Coefficient	-0.038
		p value	0.726
		N	86
	VA	Correlation Coefficient	-.278**
		p value	0.001
		N	131
	LE SPHERELE CYLIND	Correlation Coefficient	-0.081
		p value	0.393
		N	112
L CYLINDERRE AXIS	Correlation Coefficient	-0.048	
	p value	0.708	

	LE AXIS	N	63
		Correlation Coefficient	0.026
		p value	0.826
	VA	N	76
		Correlation Coefficient	-0.021
		p value	0.812
		N	132
**signifies significant p value<0.05			

Table 4:
Variation of Dioptric power according to the Age and Type of Amblyopia:
Chi - Square Test

Type of amblyopia	Range of vision	Average age (years)	Dioptric power (D)		pValue
Meridional	6/9 -6/12	11.13	-7.5D	2D	0.76
Anisometropic	6/9-6/24	12.13	-12D	+6	
Ametropic	6/12-6/36	13.48	-14.25D	+5.5D	