

Profile of Amblyopia in School going (5-15 years) Children at State Level Referral Hospital in Uttarakhand

MANISHA GUPTA¹, SUDHIR KUMAR RANA², SANJIV KUMAR MITTAL³, R.N.P. SINHA⁴

ABSTRACT

Introduction: Amblyopia is one of the common causes of childhood visual impairment. The prevalence of amblyopia usually varies according to the age group of the studied population and the factors prevailing in that region. The upper limit of the critical time when amblyopia can develop is around eight years of age and it can be permanent if corrective measures are not taken in time.

Aim: The purpose of study was to know the profile and pattern of amblyopia in children aged 5-15 years with refractive error in Uttarakhand and to compare it with national and regional (South Asian) studies.

Materials and Methods: In the present retrospective cross-sectional study, 360 children from 5-15 yrs of age who attended the OPD during the period between September 2014 to February 2015, had undergone detailed Ophthalmic examination. The children having vision < 6/12 with out organic lesion were

included in the study. The children with strabismus, previous ocular surgery and ocular diseases were excluded. Chi-Square test was done for statistical analysis (IBM SPSS Version 23).

Results: The percentage of amblyopia was 8.6% (n=31) with insignificant gender variation (p-value>0.05). Amblyopia due to astigmatism (combined) was in 41.93% (n=13) followed by Hypermetropia [32.25% (n=10)] and least in myopia [25.8% (n=8)]. In 51.61% cases age of presentation was 5-10 years while rest belonged to > 10 years of age. Binocular amblyopia was more (58.06%) than unilateral amblyopia (41.93%).

Conclusion: Refractory errors are second most common cause of paediatric amblyopia. Amblyopia and associated strabismus can have devastating psychosocial and economical fall outs. Our study emphasizes the need of visual screening of school children and prescribing them correct spectacles at appropriate time.

Keywords: Ametropia, Anisometropia, Astigmatism

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]. But the basic mechanism of amblyopia is either abnormal binocular interaction, or form deprivation in one or both eyes. If timely corrective measures (upper limit of the critical time for development of the Amblyopia eight years) are not taken, lifelong visual impairment can occur [3,10-13]. The main focus of childhood blindness in developing countries like India has been conditions like vitamin A deficiency, trauma, cataract and other causes related to malnutrition, infection, refractive error and poor health [1-4,14,15].

In our study, we retrospectively analysed the profile and pattern of amblyopia in children in the age group between 5 to 15 years, at state level referral hospital from September 2014 to February 2015 and compared it with national and regional (South Asian) studies.

MATERIALS AND METHODS

In this retrospective, hospital based study, 360 children from 5 years till 15 years of age who attended the OPD during the period from September 2014 to February 2015, were included. All the children had undergone detailed history related to the age of onset, as noticed by the patient or his guardian. Ophthalmic examination included visual acuity by Snellen vision chart, cycloplegic refraction by streak retinoscope, auto-refractometer (Righton Speed 01), thorough anterior and posterior segment and examination by

slit lamp biomicroscopy, ophthalmoscopy and assessment of the ocular alignment by cover-uncover test and ocular motility. Assessment of the binocular status of the eye was performed with the help of Worth's four-dot test and synaptophore.

An inclusion criterion was best corrected visual acuity in one or both eye 6/12 or less than 6/12 in absence of any organic lesion according to ATS [16]. Cases of strabismus, previous history of ocular surgery, trauma and diseases affecting the vision were excluded from the study. All the tests were performed under the observation of main investigator.

The criteria used for each subtype and the diagnosis were [10,11]

For ametropic amblyopia: Patients with refractive errors more than > 1.0D spherical in both eyes resulting in vision less than 6/12 or equal to 6/12 in one or both eyes and no associated strabismus or any other ocular pathology.

Anisometric amblyopia: Who had amblyopia in the presence of anisometropia that was 1 D or greater than 1 D in spherical or 1.5 D or greater difference in astigmatism between both the eyes that had persisted for more than 4 weeks after spectacle correction, in the absence of any measurable heterophoria.

Meridional amblyopia: Who had regular astigmatism equal or more than 1.5 D of astigmatism in both eyes, resulting in decrease of vision in one or both eyes and no associated strabismus. Patients with significant anisometropia (as defined above) along with the difference of 1.5 Diopter => between the two eyes were excluded from this category.

Statistics: Done using percentage, ratio and chi-square on (IBM SPSS Version 23).

RESULTS

The percentage of Amblyopia in our study was 8.6% (n=31) [Table/Fig-1].

Our study showed gender preference where amblyopic male cases 61.2% and female amblyopic cases 38.7% (as shown in [Table/Fig-2]) (p-value>0.05).

The results showed amblyopia due to astigmatism (combined) in 41.93% (n=13) followed by amblyopia due to hypermetropia was in 32.25% (n=10) and least in myopia i.e. 25.8% (n=8) [Table/Fig-3]. Age of presentation of amblyopia for 5 to 10-year-old age group was 51.61% and for 10 to 15-year-old age group was 48.38% (p-value >0.05) [Table/Fig-4]. Binocular amblyopia was more (58.06%) than unilateral amblyopia (41.93%) [Table/Fig-5]. Our study showed an equal number of amblyopia due to anisometropia and ametropia (41.93%) and least in meridional amblyopia (16.12%) [Table/Fig-6].

Total cases (n=360)	Amblyopia
329	No
31(8.6%)	Yes

[Table/Fig-1]: Percentage of amblyopia in our study.

Total cases (n=360)	Amblyopia (n=31) (100%)
Male (n=200)	19(61.29%)
Female (n=160)	12(38.71%)

[Table/Fig-2]: Gender distribution of amblyopia.

S.No.	Types of Ametropia	No. of Amblyopia	Percentage
1.	Myopia	8	25.8%
2.	Hypermetropia	10	32.25%
3.	Myopic Astigmatism	10	32.25%
4.	Hypermetropic Astigmatism	3	9.67%
Total		31	100%

[Table/Fig-3]: Distribution of type of amblyopia.

Age Group	No. of Cases	Percentage	M/F Ratio
5-10 Years	16	51.61%	13/3
10-15 Years	15	48.38%	6/9

[Table/Fig-4]: Age of presentation of amblyopia.

	No. of Amblyopia	Percentage
Monocular	13	41.93%
Binocular	18	58.06%
Total	31	100%

[Table/Fig-5]: Laterality of amblyopia.

Amblyopia	No. of Cases	Percentage
Ametropia	13	41.93%
Anisometropia	13	41.93%
Meridional	5	16.12%

[Table/Fig-6]: Types of amblyopia.

Name of study	Year	Prevalence Rate
V Kalikiyavi et al., [4]	1997	1.1%
GV Murthy et al., [14]	2002	4.4%
K Anjaneyulu et al., [17]	2015	6.6%

[Table/Fig-7]: Prevalence rate of amblyopia in national studies.

Name of study	Country	Prevalence Rate
Andrey Chia et al., [18]	China	0.8%
Jing Fu et al., [19]	China	2.5%
Kishor Sapkota et al., [20]	Nepal	1.0%
Gopal Bhandari et al., [21]	Nepal	1.4%

[Table/Fig-8]: Prevalence rate of amblyopia in South-Asian countries studies.

DISCUSSION

Prevalence of amblyopia varies because of different age-group of studied populations and different factors prevailing in that region, like literacy rate, frequency of visual screening programmes and geographical factors. The population based regional studies in India related to the childhood blindness and prevalence of refractory errors showed prevalence rate of amblyopia to be 1.1% (V Kalikiyavi et al.) [4]. In another study by Rahi et al., involving nine states in our country, cataract, uncorrected aphakia and amblyopia comprised of 12.3% severe visual impairment [3]. In the urban population, the study reported the prevalence rate of amblyopia to be about 4.4% (GV Murthy et al.) [14]. In a study done in Andhra Pradesh in India, the prevalence of amblyopia was 6.6% (K Anjaneyulu et al.) [17] [Table/Fig-7].

In South-Asian region the Chinese studies showed prevalence rate which varies between 0.8% to 2.5% in different subsets of population done by (Andrey Chia et al., and Jing Fu et al.) respectively [18,19]. In a Nepalese hospital based study the prevalence was 1% [20]. Another hospital based study done in Bharatpur, Nepal, the prevalence rate was 1.40% (Gopal Bhandari et al.) [21] [Table/Fig-8]. In our study, the percentage of Amblyopia was 8.6%, which is higher as compared to past studies [4,14,17,18-21]. It may be due to high literacy rate in the urban population, higher paediatric referrals from peripheral health centres and from visual screening programmes in schools.

In our study, we found gender preference, where the male amblyopia was 61.2% and female was 38.7% but the p-value was insignificant (p > 0.05). Similar finding was found in study done in Nepal which is demographically very similar to our study region (K Sapkota et al.) [20]. An explanation for this gender discrepancy may be due to the bias that fewer girls report, as compared to boys in our hospital-based setting. Same gender preference was found in a study done by Lee et al., [22]. But the opposite was found in study done by K Anjaneyulu et al., and Park et al., [17,23].

In our study, bilateral amblyopia was higher (58.06%) than unilateral amblyopia (41.93%), which is uncommon and opposite to the study done in Nepal (71% unilateral amblyopia) [20], in Andhra Pradesh by K Anjaneyulu et al., [17] and by Menon et al., where 7% cases were bilateral [24]. Our study however had findings consistent with study of Chung et al., where (49%) amblyopia was bilateral [25].

In our study, astigmatism was the most common refractive error (41.93%) in amblyopic eyes followed by hypermetropia (32.25%) and least was myopia (25.80%). Ametropic amblyopia and anisometropic amblyopia have equal no. of cases (41.93%) and meridional amblyopia was least common (16.12%). A Nepalese study showed similar findings where amblyopia due to astigmatism was most common (59.2%) followed by hypermetropia (33.5%). In this study, anisometropic amblyopia was the most common type of amblyopia [20]. Our study was also consistent with recent Chinese study done by Xiao et al., where astigmatism was found in 92% of amblyopic eyes [26]. In Indian study done by Menon et al., amblyopia due to hypermetropia was highest (51.65%). Anisometropia amblyopia was second most common (22.1%) after strabismus amblyopia (37.38%), followed by ametropic amblyopia 12.88%, and meridional amblyopia was 5.56% [24].

In our study, the age of presentation of amblyopia in 5-10 years age group was more for male cases (81.25%) and less for female cases (25%). In the 10-15 years age group the female cases were more (75%). Our findings are consistent with a study by K Sapkota et al., where the male/female ratio was 44/20 for younger age group and 15/19 older age group [20].

Anisometropia amblyopia is the most common cause of amblyopia in our and another study [20]. The reason for development of amblyopia in anisometropia is a chronically blurred image in one or both eye prevents the normal development of visual acuity.

Even if anisometropia is optically corrected, anisokenia may be another amblyogenic factor for development of amblyopia [27]. Severity and prevalence of amblyopia increases as the amount of anisometropia increases [28,29]. Hypermetropic patients with anisometropia of one Diopter difference may have amblyopia, while myopic anisometropic usually do not have amblyopia until anisometropia is large [30]. Unilateral high hyperopia or myopia greater than 6 Diopter can cause severe amblyopia [31,32]. 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 [31]. This is because sharply focused images of objects held closely support the normal visual development in myopia [31]. In meridional amblyopia the mild degree of astigmatism greater than 1.5 Diopter can be amblyogenic [31,32].

In Vision 2020, amblyopia is a major preventable and treatable cause of low vision paediatric age group [33-35]. If left untreated, paediatric amblyopia may result in monocular and binocular low vision [11-14,36-38] with associated deterioration in Quality of Life indices in adulthood. Therefore measures for early detection and dedicated rehabilitation of amblyopia should be a priority and also should be evidence-based. This should be the hallmark of the blindness control programme in India [34,35].

LIMITATION

Limitation of present study is that it was hospital based and sample size was small. Larger population based studies are needed to further validate the mass education measures that can be taken up, to prevent and treat this condition in our region.

CONCLUSION

We conclude from our study that refractive error is the major cause of amblyopia and if it is not corrected timely, can cause not only the permanent visual morbidity but also cause economical and psychological problem in adult life by not perusing certain occupation because of lack of binocular vision. The results of our study emphasizes the need for more school screening and public awareness programmes for prescribing the correct spectacles and educating the parents to help their children to use them (if needed).

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PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Ophthalmology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Patel Nagar, Dehradun, Uttarakhand, India.
2. Professor and Head, Department of Paediatrics, Shri Guru Ram Rai Institute of Medical and Health Sciences, Patel Nagar, Dehradun, Uttarakhand, India.
3. Professor and Head, Department of Paediatrics, Shri Guru Ram Rai Institute of Medical and Health Sciences, Patel Nagar, Dehradun, Uttarakhand, India.
4. Professor, Department of Ophthalmology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Patel Nagar, Dehradun, Uttarakhand, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Manisha Gupta,
Associate Professor, Department of Ophthalmology, Shri Guru Ram Rai Institute of Medical and Health Sciences,
Patel Nagar, Dehradun-248001, Uttarakhand, India.
E-mail: rajivmanisha@hotmail.com

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