

## Analysis of amblyopia in ametropic patients in rural India

Vijay Kumar Srivastava

Professor & HOD, Dept. of Ophthalmology, MVJ Medical College & Research Hospital, Bangalore

Email: vks\_4186@rediffmail.com

### Abstract

**Introduction:** Amblyopia means dimness of vision where the finding of diminished vision in this condition is not associated with any structural defect in the visual pathway, and it cannot be corrected with refractive correction. It results from inadequate visual experience due to variety of conditions for example: Ametropia, Anisometropia, Strabismus; or from conditions causing monocular visual deprivation in early critical period of life.

**Aims and Objective:** To analyse prevalence of amblyopia in ametropic patients in rural south India.

**Methodology:** This was prospective study of children and young adult presenting in our outpatient department during the year 2016. 59 such cases detected to have amblyopia were included in the study. The selection criteria was difference of two lines of visual acuity between the two eyes or Snellen's Vision Chart visual acuity poorer than 6/9 in any eye not recovering with spectacles correction.

**Result:** Majority of the amblyopic patients were having Hyperopia & Anisohyperopia (46.03%) or Hyperopic astigmatism (16.94%). This was followed by Myopic astigmatism (15.25%), Myopia & Anisomyopia (13.55%) and Mixed Astigmatism (8.47%). Majority of the patients were Males 55.93% followed by Females 44.06%. It was observed that majority of the patients were having Monocular amblyopia (81.35%) and 18.64% had Binocular Amblyopia.

**Conclusion:** The Amblyopia is associated with the ametropia so early detection of refractive errors and corrections should be prompt everywhere since from the young age.

**Keywords:** Amblyopia, Ametropia, Anisohyperopia, Anisomyopia, Astigmatism

### Introduction

Amblyopia means dull vision. The finding of diminished vision in this condition is not associated with any structural defect in the visual pathway, and it cannot be corrected with refractive correction. It results from inadequate visual experience due to various conditions such as Ametropia, Anisometropia, Strabismus; or from conditions causing monocular visual deprivation in early critical period of life. Amblyopia is one of the most common causes of monocular visual impairment in children and young adults.

Refractive errors in the form of myopia, hyperopia with or without presence of astigmatism, either simple or compound, is very commonly found in population and often remains uncorrected in many cases. Millions of people suffer from visual difficulty due to uncorrected refractive error and in cases of ametropia and anisometropia they are likely to develop amblyopia if unattended in early critical period of visual development. suitable correction can prevent the development of Amblyopia in childhood and facilitates improved performance at school.<sup>(1)</sup> Amblyopia and strabismus are one of the commonest ocular conditions occurring during childhood. Amblyopia is the main cause of visual loss in childhood. Rajavi in his study have found prevalence of amblyopia of 2.3% in study participants: however he has compared the results of 15 such studies and recorded the range of incidence from 0.3% to 7.4%, but majority of the studies had incidence of approximately 2%.<sup>(2)</sup> Taylor V has shown cost effectiveness and importance of visual screening at the

age 4-5 years.<sup>(3)</sup> It has been shown that correcting the etiological factors for amblyopia in early childhood almost eliminates the problem:<sup>(4)</sup> since it is reduction of visual acuity mainly in the first decade of life. In North America the prevalence has been reported to be 2-4%.<sup>(5)</sup> DGHS, in its status report have observed that roughly half are not wearing corrective spectacles. Effective planning is needed to eliminate this preventable and manageable cause of visual impairment.<sup>(6)</sup> Amblyopia is the most common cause of reduced vision unilaterally of childhood onset than all other causes added together. In India after cataract ametropia is the second largest cause of blindness.<sup>(7)</sup> Amblyopia is one of the most common causes of monocular visual impairment in children and young adults. Hosseinmenni in his study has shown that when examined for pattern visual evoked potentials (PVEPs) P100 latency was significantly increased in amblyopic eyes compared to the normal eyes.<sup>(8)</sup>

### Aims and Objective

To find out prevalence of amblyopia in ametropic patients in rural south India.

### Methodology

This was prospective study of all children and young adult presenting in our outpatient department during the year 2016. 59 such cases having amblyopia were included in the study. The selection criteria was difference of two lines of visual acuity between the two eyes or Snellen's Vision Chart visual acuity poorer than 6/9 in any eye not improving with spectacles. Thorough

history taking and examination was undertaken which included visual acuity by Snellen's Vision Chart, refraction using cycloplegics, examination of anterior segment as well as posterior segment of the eye. For categorization of refractive errors the following criteria were used:

**Anisometropic amblyopia:** This included patients with amblyopia and anisometropia that was 1 D or more in spherical equivalent, or a 1.5 D or more difference in astigmatism between the two eyes.

**Ametropic amblyopia:** Patients who had errors of refraction greater than 1 D spherical equivalent in both eyes which had resulted in subnormal vision in either or both eyes without having associated strabismus or any other pathology in the eyes were classified under this category.

**Meridional amblyopia (Amblyopia with Astigmatism):** Patients with regular astigmatism equal to or more than 1.5 D of astigmatism in any meridian or those having irregular astigmatism in bilaterally, which had caused diminution of vision in either or both eyes and who had no associated strabismus were classified in this group of meridional amblyopia. Patients having anisometropia showing a difference of 1.5 D or greater astigmatism between the two eyes were not kept in this category and placed under the anisometropic amblyopia.

## Result

**Table 1: Distribution of Study patients as per Sex**

Sex	No	Percentage (%)
Male	33	55.93
Female	26	44.06
Total	59	100

Majority of the patients were Males 55.93% followed by Females 44.06%.

**Table 2: Distribution of patients as per the type of Ametropia**

Type of Ametropia	No	Percentage (%)
Hyperopia & Anisohyperopia	27	45.76
Hyperopic astigmatism	10	16.94
Myopia & Anisomyopia	8	13.55
Myopic astigmatism	9	15.25
Mixed astigmatism	5	8.47
Total	59	100

Majority of the amblyopic patients were having Hyperopia & Anisohyperopia (45.76%) or Hyperopic astigmatism (16.94%). This was followed by Myopic astigmatism (15.25%), Myopia & Anisomyopia (13.55%) and Mixed Astigmatism (8.47%).

**Table 3: Distribution of Study Patients based on Laterality of Amblyopia**

Laterality	No	Percentage (%)
Monocular	48	81.35
Binocular	11	18.64
Total	59	100

It was observed that majority of the patients were having Monocular amblyopia (81.35%) and 18.64% had Binocular Amblyopia.

## Discussion

Amblyopia is diminution in visual acuity either in one eye or both eyes, caused by deprivation of form vision or abnormal binocular interaction, either or both, for which one cannot find any organic cause. Von Graefe had described amblyopia as that condition in which the observer sees nothing and the patient very little.<sup>(9)</sup> It results from abnormal or inadequate stimulation of the visual system during a critical and early period of visual development.<sup>(10)</sup> The critical period of visual development occurs during early childhood hence Amblyopia develops in that period only and if untreated can become permanent. Some amblyopes may show abnormalities in retina, but these may be rare features of amblyopia.<sup>(11)</sup> There may be shrinkage of cells in the parvo cellular layers, which receive input from the amblyopic eye which may be more evident in the ipsilateral lateral geniculate nucleus.<sup>(12)</sup> When there is difference of refractive error in eyes, the better eye gets a more focused image on retina than the worse eye. When these images reach cerebral cortex the poor image is actively suppressed and this leads to amblyopia. It develops more often in anisohypermetropia because the poorer eye is neither used for distance vision nor near: whereas, in anisomyopia, the more myopic eye is used for near vision. When there is equal high refractive error in both eyes amblyopia can still develop which is more common in hypermetropia than myopia.<sup>(13)</sup> In our study we found regarding laterality of Amblyopia that majority of the patients were having monocular amblyopia 81.35% followed by binocular 18.64%. Similar to our study, Ikuomenisan<sup>(14)</sup> in his study found 87% amblyopia cases unilateral, whereas Hendler<sup>(15)</sup> found 77% cases unilateral. In our study we have observed that majority of the amblyopic patients were having Hyperopia & Anisohyperopia (45.76%) or Hyperopic astigmatism (16.94%). This was followed by Myopic astigmatism (15.25%), Myopia & Anisomyopia (13.55%) and Mixed Astigmatism (8.47%) Majority of the patients were Males 55.93% followed by Females 44.06%. Similar distribution of refractive error among amblyopic patients have been demonstrated by Menon et al<sup>(16)</sup> and other workers.<sup>(17,18,19)</sup>

## Conclusion

The Amblyopia is usually associated with the ametropia so early detection of refractive errors and corrections should be prompt from the young age, when it is still reversible.

## References

1. WHO, Programmes and projects, Prevention of Blindness and Visual Impairment. Causes of blindness and visual impairment, [Online], cited on 28th Aug, 2008, Available at URL <http://www.who.int/blindness/causes/priority/en/index5.html>, p.no 6.
2. Rajavi Z, Sabbaghi H, Baghini AS, Yaseri M, Moein H, Akbarian S, Behradfar N, Hosseini S, Rabei HM, Sheibani K. Prevalence of amblyopia and refractive errors among primary school children. *J Ophthalmic Vis Res* 2015;10:408-16.
3. Tailor V, Bossi M, Greenwood JA, Dahlmann-Noor A. Childhood amblyopia: current management and new trends. *Br Med Bull*. 2016 Sep;119(1):75-86. doi: 10.1093/bmb/ldw030. Review.
4. Stager DR. Amblyopia and the pediatrician. *Paed ann*.1983 Aug; 12(8):574-6, 578-84. [Online], cited on 30th August 2008. Available at URL <http://www.ncbi.nlm.nih.gov/pubmed/6622077>.
5. Friendly DS. Amblyopia: definition, classification, diagnosis, and management considerations for pediatricians, family physicians, and general practitioners *Pediatr Clin North Am*. 1987 Dec;34(6):1389-401 [Online], cited on 30th August 2008. Available at URL <http://www.ncbi.nlm.nih.gov/pubmed/3317236>.
6. Sapkota YD, Adhikari BN, Pokharel GP, Poudyal BK, Ellwein LB. "Ophthalmic Epidemiology", 1 January 2008;15:17-23.
7. Govt. of India (1992), Present Status of National Programme for Control of Blindness, Ophthalmology Section, DGHS, New Delhi, 1992.
8. Hosseinmenni S, Talebnejad MR, Jafarzadehpur E, Mirzajani A, Osroosh E. P100 Wave Latency in Anisometropic and Esotropic Amblyopia versus Normal Eyes. *J Ophthalmic Vis Res*. 2015 Jul-Sep;10(3):268-73. doi: 10.4103/2008-322X.170359.
9. Von Noorden GK, Mechanism of amblyopia. *Doc Ophthalmol* 1977;34:93.
10. Early visual development: Normal and Abnormal. Edited by Kurt Simons. New York: Oxford University Press, 1993:14-29.
11. Arden GB, Carter RM, Hogger, Powel DJ, Vaegen Jw, reduced pattern electroretinogram suggest a pre ganglionic basis for non-treatable human amblyopia. *Journal of Physiology* 1980;308:82-83.
12. Von Noorden GK, Crawford MLJ. The lateral geniculate nucleus in human Strabismic amblyopia *invest Ophthal Vis Sci* 1992;33:2729-2732.
13. Von Noorden GK: Examination of the patient III: Sensory signs, Symptoms and adaptation in Strabismus. In binocular vision and ocular motility St. Louis: CV Mosby: 1996:216-254.
14. Ikuomenisan SJ, Musa KO, Aribaba OT, Onakoya AO. Prevalence and pattern of amblyopia among primary school pupils in Kosofe town, Lagos state, Nigeria. *Niger Postgrad Med J*. 2016 Oct-Dec;23(4):196-201. doi: 10.4103/1117-1936.196261.
15. Hendler K, Mehravaran S, Lu X, Brown SI, Mondino BJ, Coleman AL. Refractive Errors and Amblyopia in the UCLA Preschool Vision Program; First Year Results. *Am J Ophthalmol*. 2016 Dec;172:80-86. doi: 10.1016/j.ajo.2016.09.010.
16. Menon V, Chaudhuri Z, Saxena R, Gill K, Sachdev MM. Profile of amblyopia in a hospital referral practice. *Indian J Ophthalmol* 2005;53:227-34.
17. Alemayehu Woldeyes, Abonesh Girma. Profile of Amblyopia at the Pediatric Ophthalmology Clinic of Menilik II Hospital, Addis Ababa. *Ethiop.J.Health Dev*. 2008;22(2):201-205].
18. Aldebasi YH. Prevalence of amblyopia in primary school children in Qassim province, Kingdom of Saudi Arabia. *Middle East Afr J Ophthalmol* 2015;22:86-91.
19. Bhandari G, Byanju R, Kandel RP (2015) Prevalence and Profile of Amblyopia in Children at Bharatpur Eye Hospital. *Ann Pediatr Child Health* 3(8):1085.