



## ANISOMETROPIC AMBLYOPIC PATIENTS; STATUS OF BINOCULAR SINGLE VISION IN EYE OPD OF SHALAMAR HOSPITAL, LAHORE.

Dr. Syed Nishat Akram<sup>1</sup>, Muhammad Ajmal<sup>2</sup>, Khusbu Fatima<sup>3</sup>, Dr. Aamir Furqan<sup>4</sup>, Farman Ali<sup>5</sup>

1. OD, Program Coordinator  
Shalamar Hospital Lahore.
2. M Phil, Orthoptist  
Children Hospital Lahore.
3. MPhil.  
University of Faisalabad.
4. Assistant Professor  
Nisthar Institute of Dentistry Multan.
5. ICU Technologist.  
CPEIC Multan

**Correspondence Address:**

Dr. Aamir Furqan  
Assistant Professor  
Nisthar Institute of Dentistry Multan.  
draamir2009@hotmail.com

**Article received on:**

08/11/2016

**Accepted for publication:**

15/01/2017

**Received after proof reading:**

07/03/2017

**ABSTRACT... Objectives:** To compare the status of stereopsis in anisometropic amblyopic patients of 11-30 years of age and the type of anisometropic amblyopia associated with deficient BSV in patients of Eye OPD of Shalamar Hospital, Lahore. **Study design:** Descriptive cross sectional study **Setting:** Eye OPD, Shalamar Hospital, Lahore. **Duration:** From August 2015 to August 2016. **Materials and Methods:** Two hundred (200) patients were selected for the study. Computer software SPSS version 16 was used to analyze the data. Categorical data was presented as frequencies and percentages and numerical data presented as mean  $\pm$  standard deviation. **Results:** Frequency of anisometropic amblyopia is relatively higher in age groups 26-30. Age group 11-15, 16-20 and 21-25 have relatively low rate of amblyopia due to anisometropia.  $P = 0.000$  a significant value. **Conclusion:** Frequency and severity of anisometropia in this clinical sample from the Eye OPD of Shalamar Hospital, Lahore that increased as the level of ametropia increased. Both spherical ametropia and astigmatism were independently associated with anisometropia. Furthermore, both Spherical and cylindrical anisometropic amblyopia are independently associated with deficient BSV. Simple hypermetropic amblyopia was the most common cause associate with deficient BSV. The commonly affected age group in our study was 25-30 year.

**Key words:** anisometropic, amlyopia, binocular, single vision, eye OPD, monocular.

**Article Citation:** Akram SN, Ajmal M, Fatima K, Furqan A, Ali F. Anisometropic amblyopic patients; status of binocular single vision in eye OPD of Shalamar Hospital, Lahore. Professional Med J 2017;24(3):473-477.

**DOI:** 10.17957/TPMJ/17.3719

### INTRODUCTION

Binocular single vision is labeled as the power to fuse images from both eyes to detect the depth of both eyes.<sup>1</sup> Role of binocular single vision in detection of depth, book reading, perceiving similar things and coordination of eye and hand are the main functions of binocular vision.<sup>2</sup> Normal BV improves functional vision by summation and stereopsis. Binocular summation, the improvement in visual sensitivity with binocular viewing compared with monocular viewing, provides only a small increase in sensitivity when measured by threshold responses, but it may be a larger factor for performance measured supra-threshold stimuli. Stereopsis is a quantitative and. qualitative improvement in relative depth perception that occurs with binocular viewing.<sup>3</sup>

Anisometropiais one of the leading causes of deficient binocular vision from various

binocular anomalies of visual system. In this study, we investigated the status of binocularity in anisometropic patients. Anisometropia, a condition in which two eyes have disparate refractive power equal to or greater than 1 D in one or more meridians".<sup>4</sup> A small degree of anisometropia is of no significance. A difference of 1 D in two eyes causes a 2% difference in the size of both retinal images.<sup>5</sup> A difference of up to 5% in retinal images is well tolerated. An anisometropia up to 2.5 D is tolerated and between 2.5 D and 4 D depends upon individual sensitivity and >4 D is intolerable and of much clinical concern. Clinically it is divided into Simple Anisometropia, Mixed Anisometropia, Compound Anisometropia, Simple Astigmatic Anisometropia, Compound Astigmatic Anisometropia, Mixed Astigmatic Anisometropia. Vertical Anisometropiais unequal refraction in the vertical meridian alone. In this study we studied six major types and also we

took the vertical anisometropia and astigmatic anisometropia as the same entities. Treatment options for anisometropia include spectacles, contact lenses, anisometropic spectacles, intraocular lens implantation for unilateral aphakes, refractive corneal surgery for unilateral myopes, astigmatics, and hypermetropes and removal of crystalline lens for unilateral high myopes.<sup>6</sup> Anisometropias often associated with amblyopia in the presence of and in the absence of strabismus. Anisometropia is a leading cause of amblyopia and the mechanism of anisometropic amblyopia is not fully understood.<sup>7</sup> It is generally accepted that anisometropic refractive errors must be corrected in patients with settled amblyopia or strabismus, it is not found yet, what levels of anisometropia should be corrected in children of good mental and physical health state and difficult to judge that at what age group visual correction should be made to ensure optimal visual development. This question is important to prevent and manage the amblyopia, because the available data supports that uncorrected anisometropic response during critical periods affects the binocular response. The sensitive period during which acuity of an amblyopic eye can be improved is usually up to age of 7-8 years in strabismic amblyopia and may be longer (into teens) for anisometropic amblyopia of patients in which binocular vision is ideal. Weakley et al<sup>8</sup> concluded that higher chances of amblyopia with myopic anisometropia of below two diopter, hyperopic anisometropia more than one diopter and astigmatic anisometropia below 1.5 diopter. Hussein and co concluded in their study on children with amblyopia and age greater than six years that risk factor for failure of anisometropic amblyopia treatment were older age group, astigmatism of below 1.5 diopter, lack of cooperation and early visual acuity in amblyopic eye of less than 20/200.

## RESULTS

Out of 200 patients, 52(26%) are in age group 11-15 year. 48(24%) are in age group 16-20 year. 36(18%) are in age group 21-25 year and 64(32%) are in age group 26-30 year (Table-I). When we concern about types of Amblyopia out of 200 patients 88(44%) are Hypermetropic

Anisometropic Amblyope, 32(16%) are Myopic Anisometropic Amblyope, 36(18%) are Astigmatic Anisometropic Amblyope, 12(6%) are Mixed Anisometropic Amblyope, 16(8%) are Compound Myopic Anisometropic Amblyope and 16(8%) are Compound Hypermetropic Anisometropic Amblyopes (Table-II). Table-3 shows the frequency of stereopsis, out of 200 patients 52(26%) were having stereopsis 60-40 seconds of arc, 56(28%) were having stereopsis 400-600 seconds of arc, 12(6%) were having stereopsis 3000-400 seconds of arc and 80(40%) were having no stereopsis (Table-III). Stratification of types of Amblyopia and stereopsis shown in Table-V. Frequency of anisometropic amblyopia is relatively higher in age groups 26-30. Age group 11-15, 16-20 and 21-25 have relatively low rate of amblyopia due to anisometropia (Table-V).

Age Groups	Frequency	Percentages
11-15	52	26.0 %
16-20	48	24.0 %
21-25	36	18.0 %
Total	200	100.0 %

Table-I. Demographic Variables

Type of Amblyopia	Frequency	Percentages
Hypermetropic Anisometropic Amblyopia	88	44.0 %
Myopic Anisometropic Amblyopia	32	16.0 %
Astigmatic Anisometropic Amblyopia	36	18.0 %
Mixed Anisometropic Amblyopia	12	6.0 %
Compound Myopic Anisometropic Amblyopia	16	8.0 %
Compound Hypermetropic Anisometropic Amblyopia	16	8.0 %
Total	200	100.0 %

Table-II. Frequencies of Types of Anisometropic Amblyopia

Stereopsis/sec of arc	Frequency	Percentages
60-40	52	26.0
400-60	56	28.0
3000-400	12	6.0
Absent	80	40.0
Total	200	100.0

Table-III. Types of Stereopsis

Type of Amblyopia	Stereopsis				Total
	60-40	400-60	3000-400	Absent	
Hypermetropic Anisometropic Amblyopia	24	24	8	32	88
Myopic Anisometropic Amblyopia	16	0	0	16	32
Astigmatic Anisometropic Amblyopia	4	12	0	20	36
Mixed Anisometropic Amblyopia	4	4	0	4	12
Compound Myopic Anisometropic Amblyopia	4	4	4	4	16
Compound Hypermetropic Anisometropic Amblyopia	0	12	0	4	16
Total	52	56	12	80	200

Table-IV. Inferential Results.

Type of Amblyopia	Age of Patients				Total
	11-15	16-20	21-25	26-30	
Hypermetropic Anisometropic Amblyopia	16	16	28	28	88
Myopic Anisometropic Amblyopia	12	12	4	4	32
Astigmatic Anisometropic Amblyopia	20	12	0	4	36
Mixed Anisometropic Amblyopia	0	0	0	12	12
Compound Myopic Anisometropic Amblyopia	4	8	0	4	16
Compound Hypermetropic Anisometropic Amblyopia	0	0	4	12	16
Total	52	48	36	64	200
P Value	0.000				

Table-V. Inferential Results.

## DISCUSSION

In our study a total of 200 patients were examined in the period of about one year. Visual acuity of all the patients was tested. Patients with visual acuity <6/18 in one or both eyes underwent objective and subjective refraction. Regarding age 200 patients 52(26%) were in age group 11-15 year. 48(24%) were in age group 16-20 year. 36(18%) were in age group 21-25 year and 64(32%) were in group age group 26-30 year. With respect to type of anisometropic amblyopia, that out of 200 patients 88(44%) are Hypermetropic Anisometropic Amblyopia, 32(16%) are Myopic Anisometropic Amblyopia, 36(18%) are Astigmatic Anisometropic Amblyopia, 12(6%) are Mixed Anisometropic Amblyopia, 16(8%) are Compound Myopic Anisometropic Amblyopia and 16(8%) are Compound Hypermetropic Anisometropic Amblyopia.

Our results showed that the type of anisometropic amblyopia that is usually associated with deficient BSV was simple hypermetropic amblyopia. The second highest ranked type of anisometropic amblyopia was myopic anisometropic amblyopia and astigmatic anisometropia. The difference between latter two is of no statistically significant.

Patients with age group 26-30 were more effective of deficient BSV as compared to age groups 11-15, 16-20 and 21-25.

D Velma et al. included 972 children in his study and concluded that best corrected inter intraocular acuity difference and amblyopia are related to strength and type of refractive error difference (astigmatism hyperopic and myopic) between eyes. The development of stereo acuity is particularly dependent on similarity of the refractive error between eyes.<sup>10</sup>

Leon et al. concluded that Children with higher magnitudes of anisometropia had higher prevalence and depth of amblyopia. Children with old age had greater risk of amblyopia as compared to children with younger age level for a medium magnitude of anisometropia. Low level anisometropia in younger children may not predispose to amblyopia; these findings have greater significance for vision screening criteria at different ages.<sup>11</sup>

Caputo R et al. concludes that it is difficult to develop a guideline for diagnosis and treatment of anisometropia. Even though there seems

to be a correlation between type and angle of anisometropia in large number of patients, a large number of subjects are not according to this according to this pattern. One more idea about good prognosis is the finding of binocular vision at first screening it improves visual recovery with the change in shape of optical fibers without changing treatment plan.<sup>12</sup>

The results of our study are valid for distribution type of anisometropic amblyopia in different age groups as our data supports that age groups 11-15, 16-20, 21-25 have relatively less severity of anisometropic amblyopia as compared to the age group 25-30. Our data also supports the previous studies that younger children have more potential of stereopsis than adults.

But our study was an institution (tertiary care centre) based study, and during pilot study it was come to know that younger children although had good stereopsis but most of them consume lot of time and are non-cooperative during the clinical investigations and examination, that is why children < 11 year were not included in the study.

Our data also supports the study that older children and adults are having dense amblyopia as compared to younger ones.

The results of our study are of much concern of public and health care management. As the magnitude of anisometropic Amblyopes is high in old age groups in our study, although it is a preventable and treatable visual loss if detected in early childhood.

## CONCLUSION

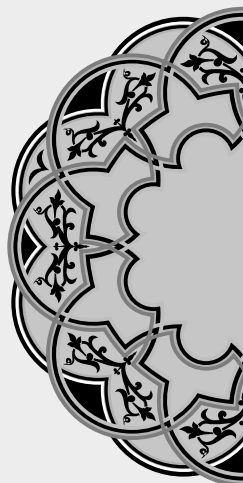
Frequency and severity of anisometropia in this clinical sample from the Eye OPD of Shalamar Hospital, Lahore that increased as the level of ametropia increased. Astigmatism and spherical ametropia were individually associated with anisometropia. Furthermore, both Spherical and cylindrical anisometropic amblyopia are independently associated with deficient BSV.

Simple hypermetropic amblyopia was the most common cause associate with deficient BSV. The commonly affected age group in our study was 25-30 year.

Copyright© 15 Jan, 2017.

## REFERENCES

1. JJ, Kanski: **Clinical Ophthalmology, 6<sup>th</sup> ed.** New York: ELSEVIER; 2007,pp.743.
2. Sheedy JE, Bailey IL, Buri M, Bass E. **Binocular vs. monocular task performance.** Am J Optom Physiol Opt. 1986 Oct; 63(10):839-46.
3. Wheatstone, Charles (1838). “**Contributions to the physiology of vision.—Part the First. On some remarkable, and hitherto unobserved, phenomena of binocular vision**”. Philosophical Transactions of the Royal Society of London 128 (0): 371–394.
4. William JB. **Borish’s Clinical Refraction. 2nd Edition.** Butterworth-Heinemann; 2006. pp. 1479-1480.
5. D Abrams: **Duke-Elder’s Practice of Refraction, 10<sup>th</sup> ed.** New Dehli: Elsevier; 2005,pp.105-106.
6. AK Khurrana: **Theory and Practice of Optics and Refraction, 2<sup>nd</sup> Ed.** New Dehli: Elsevier; 2009. Pp.85-86.
7. Dadeya S, Kamlesh, Shibal F. **The effect of anisometropia on binocular visual function.** Indian J Ophthalmol 2001; 49:261.
8. Weakley DR. **The association between anisometropia, amblyopia, and binocularity in the absence of strabismus.** Trans Am Ophthalmol Soc. 1999; 97:987-1021.
9. Hussein MA, Coats DK, Muthialu A, Cohen E, Paysse EA. **Risk factors for treatment failure of anisometropic amblyopia.** J AAPOS. 2004; 8(5):429-34.
10. D Velma, Miller JM, Clifford-Donaldson CE, Harvey EM. **Associations between Anisometropia, Amblyopia, and Reduced Stereoacuity in a School-Aged Population with a High Prevalence of Astigmatism.** Invest. Ophthalmol. Vis. Sci. 2008; 49(10):4427-36.
11. Leon A, Donahue SP, Morrison DG, Estes RL, Li C. **The age-dependent effect of anisometropia magnitude on anisometropic amblyopia severity.** J AAPOS. 2008; 12(2)150–156.
12. Caputo R, Frosini R, De Libero C, Campa L, Del Magro EF, Secci J. **Factors influencing severity of and recovery from anisometropic amblyopia.** Strabismus. 2007; 15:209–214.



*“It is not enough to aim;  
you must hit.”*

**Italian Proverb**

#### **AUTHORSHIP AND CONTRIBUTION DECLARATION**

<b>Sr. #</b>	<b>Author-s Full Name</b>	<b>Contribution to the paper</b>	<b>Author=s Signature</b>
1	Dr. Syed Nishat Akram	Concieve idea, Design study	
2	Muhammad Ajmal	Data collection, manuscript writing	
3	Khusbu Fatima	Data analysis, manuscript writing	
4	Dr. Aamir Furqan	Proof reading, Statistical analysis	
5	Farman Ali	Data analysis, Help in manuscript writing	