

Profile of Strabismus at a Tertiary Care Hospital in Kashmir

Rimsha Sarosh¹, Afroz Khan², Omar Rashid³, Birjees Hakak⁴, Arsalan un Nisa⁵, Parsa Sarosh⁶

ABSTRACT

Introduction: Strabismus is a state of abnormal alignment of the two eyes. Current research was aimed at studying the profile of strabismus at a tertiary care hospital in Kashmir valley.

Material and methods: Strabismus patients attending squint clinic of a tertiary care referral centre in Kashmir, between December, 2015 and December, 2017, across all age groups were included in this study. Patients operated previously for strabismus were excluded. Visual acuity, cycloplegic retinoscopy, stereopsis assessment were done in all patients. Strabismus was objectively measured using Prism Cover Test / Modified Krimsky method.

Results: During the defined period a total of 911 patients were evaluated and included in this study. Out of these, 516 (56.6%) were females and 395(43.3%) were males. 37.1% of the study cohort were products of consanguineous marriages. History of prematurity and turbulent perinatal period was elicited in 4% and 18% of the patients respectively. As regards the pattern of strabismus in our study population 59.93% had esotropia, 36.6% had exotropia. Inferior oblique overaction and Dissociated vertical deviation were seen in 22.61% and 23.38% respectively. Duane's Retraction syndrome (0.98%), Superior oblique palsy (1.2%), Brown's syndrome (0.21%), Third nerve Palsy (0.32%), LR palsy (0.65%) were the lesser common deviations noted.

Conclusion: Esotropia is the most common motility disorder among patients attending a tertiary care hospital in Kashmir, in contrast to rest of India. Statistics from majority of colder regions of the world show the same inclination, further reinforcing the theory of association between sunlight and exodrift.

Keywords: Strabismus, Exotropia, Esotropia, Stereopsis.

potential friends and partners. However, a review of current literature shows a tendency to denounce the use of the word "cosmetic" within the treatment specifications, in an attempt to highlight that strabismus is a pathological state of the binocular visual system, affecting the normal appearance and hence the quality of life.¹¹

The main goal of treatment in strabismus is restoration of eye alignment together with fusion and stereoacuity. Additional favourable outcomes include improvement or elimination of an anomalous head posture, expansion of binocular visual fields and elimination of double vision.¹²

The aim of our study was to attempt an understanding of the distribution of various strabismus subtypes in the ethnically and racially distinct Kashmiri population.

MATERIAL AND METHODS

The present study was carried out in a tertiary care referral hospital. Strabismus patients, across all age groups, attending the Squint Clinic of Government Medical College and associated SMHS Hospital, Srinagar, Jammu and Kashmir, India from December 2015 to December 2017, were examined and assessed in a prospective manner. Patients operated previously for strabismus were excluded. Detailed birth and family history particulars were taken from the parents. Visual acuity assessment, cycloplegic retinoscopy, anterior segment examination and fundoscopy was done in all patients. Deviation was measured objectively using Prism Bar Cover Test and Modified Krimsky test. Lang stereotest, Worth 4 Dot Test and Randot stereotest were used to evaluate Binocular single vision and stereopsis. Before the start of the study ethical clearance and informed consent was obtained respectively from the institute and subjects.

RESULTS

Out of a total of 911 patients that visited our clinic during the

INTRODUCTION

Strabismus is a state of abnormal alignment of the two eyes.¹ This condition has a multi dimensional impact on the patient's life and is fairly common.

Various epidemiological studies place the prevalence at around 0.5 to 5%, varying substantially with the region.²⁻⁶ Strabismus might be associated with amblyopia, adding another spectrum to the functional disability. Visual loss coupled with poor self image and esteem places the person at a social and emotional disadvantage and contribute to low Quality Of Life in these patients.^{7,8} The society is prejudiced against strabismic individuals, often underestimating their Intelligent Quotient and stereotyping them.^{9,10} It is of utmost importance to understand that the general societal standards classify strabismus as a cosmetic disadvantage only, failing to realise the functional aspect of this disease. The patients are viewed as inferior to the peers with less appeal as

¹Senior Resident, Department of Ophthalmology, ²Professor, Department of Ophthalmology, ³Lecturer, Department of Ophthalmology, ⁴Resident, Department of Ophthalmology, ⁵Resident, Department of Ophthalmology, Government Medical College and SMHS Hospital, ⁶Postgraduate Scholar, Department of Electronics and Instrumentation Technology, University of Kashmir, Hazratbal, Srinagar, Jammu and Kashmir, India

Corresponding author: Dr Rimsha Sarosh, c/o Professor Dost Mohammad, Mir House, Behind Kashmir University, Naseembagh, Hazratbal, Srinagar, Jammu and Kashmir, India -190006

How to cite this article: Rimsha Sarosh, Afroz Khan, Omar Rashid, Birjees Hakak, Arsalan un Nisa, Parsa Sarosh. Profile of strabismus at a tertiary care hospital in Kashmir. International Journal of Contemporary Medical Research 2018;5(6):F4-F7.

DOI: <http://dx.doi.org/10.21276/ijcmr.2018.5.6.8>

specified period, 395 (43.3%) were males and 516 (56.6%) were females.

Patients from all age groups were included in our study. The number of patients across different age groups is shown as per table.(Table 1)

Our 338 patients were born out of consanguineous marriages (37.10%).Thirty seven (4%) patients were born prematurely and 164 patients (18%) had turbulent perinatal history including Neonatal Intensive Care Unit admission. Seventy two patients (7.9%) gave family history of strabismus.

As regards the pattern of strabismus, preponderance of esotropia was seen, followed by exotropia. (Table 2)

Refractive assessment of the patients revealed hypermetropia to be the most common refractive error with 63% of esotropes and 2% of exotropes being hyperopic[S.E >+2 Dioptres]. Out of the total number (334 exotropes and 546 esotropes), 19.6% of exotropes and 3% esotropes respectively were myopic [S.E<-0.5 DIOPTRES]. Simple and Compound astigmatism was noted in 19.5% of esotropes and 11.3% of exotropes. Amblyopia was diagnosed in 327 patients (35.89%).

Prism cover test was employed to measure the deviation objectively. In amblyopic or sensory strabismus patients, Modified Krimsky method was used. Most of our strabismus patients had large angle squints. The composite variation of the measured deviations is summarized in Table 3.

Esotropia was our most frequently encountered strabismus entity. Out of our 911 patients, 546 were found to have Esotropia. When the sub type analysis was undertaken, we found 26.7% patients had Accommodative Esotropia and 37.17% had Partially Accommodative Esotropia. Congenital Esotropia formed only 19% of our study cohort. (Table 4)

Exotropia was the second most common strabismus seen in our study population. Most of our Exotropia patients were diagnosed with Intermittent exotropia. (Table 5)

Stereopsis was seen in 91% of intermittent exotropes and 31.1% of accommodative esotropia patients. Other forms of strabismus including sensory strabismus cases showed poor results on this parameter.

DISCUSSION

In simple terms, strabismus is a condition in which the two eyes of an individual are not in accord and proper alignment. Since our study was a single-centre study conducted at a tertiary care referral hospital, we did not attempt to infer any prevalence rate from our results, as overestimation was bound to occur.

As Kashmir is a Muslim majority area, consanguinity is quite common here. As expected, in the light of various family based studies, 37.10% patients of our study cohort were inborn. Ziakas et al (26.1%) and Bagheri et al (37.7%) had similar observations.^{13,14} Prematurity, low birth weight, low Apgar scores, and a family history of strabismus are considered significant risk factors for strabismus.^{15,16} Our study cohort had only 4% preterm born patients and 18% had history of neonatal ICU admission. An interesting finding was that only 7.9% patients had a family history of strabismus as against the observation of 15% by Abrahamsson et al.¹⁷

The reason for this could be the general feeling amongst the native population that familial and congenital diseases are not curable. Often, the parents vehemently deny and conceal the congenital nature and any past treatment history as well. Our study results show a female preponderance for strabismus which is in agreement with, Akpe BA et al, YU et al. and Mohny BG et al.^{18,19,20}

Strabismus is a multifactorially influenced trait and shows wide variations as per genetic and environmental variables. Study results from China, Japan, South India, Hong Kong, Brazil, Singapore, Cameroon, Baltimore (USA), Arizona (USA) and show exotropia prevalence to be higher.^{2,3,4,19,21-25}

Prevalence studies show Esotropia to be the most common form of strabismus in United Kingdom, Minnesota(USA), Nigeria, Pakistan, Tanzania, Sudan and Ethiopia.^{5,16,18,26-29}

Rachael et al have proposed that geographical regions of the world with higher intensity of sunlight have exotropia as the most common form of strabismus.³⁰ Kashmir is a cold place with four seasons and winter temperatures going as low as -10 degree C in the capital city. Our results are in perfect accordance since esotropia is our most common strabismus form (59.93%). P. A Graham in his study conducted in the United Kingdom found that esotropes outnumbered exotropes⁵ Yu et al in his study found exotropia to be more prevalent than esotropia in Hong Kong, and concluded that esotropia is probably higher in white than in Asian children because white children are more likely to be hyperopic.¹⁹ We also found hyperopia to be the most common refractive error in our study population along with a low incidence of myopia. The reason might be the fact that our hospital caters to largely rural illiterate population in whom myopia is expected to be low.

In the current study, Accommodative Esotropia was found to be the most common form of esotropia(63.87%), with Fully Accommodative Esotropia forming 26.7% and Partially Accommodative esotropia, 37.17% of our study cohort. Similar results were seen in PA Graham 's study wherein Partially Accommodative Esotropia was the most prevalent eso-deviation. Chia et al also reported higher proportion of Accommodative esotropes (53%) in their study, however Fully Accommodative esotropia patients (30%) outnumbered Partially Accommodative ones.(23%).^{5,22}

Out of our 334 exotropes, 194 (58%) had intermittent exotropia, making it our most common exo-deviation. Our study results are in accordance with those of Yu et al where 64% of exotropes had intermittent exotropia. Chia et al(92%) and Robaei et al (93%) found very high proportion of patients to have intermittent exo-Deviation.^{19,22,31} Probably patients with intermittent deviations present late to the eyecare centres in this under-developed part of the world, where parents consult godmen before doctors.

As per Capo et al, Inferior oblique over-action develops in 72% of congenital esotropes, 34% of accommodative esotropes and 32% of intermittent exotropes. We observed this finding in 22.6%, which is substantially less. A possible reason would be inclusion of only clinically significant overaction(+2) and above in our study.³²

S. No	Age distribution	No of patients	Percentage
1	< 10 years	419	45.9
2	10-20 years	264	28.97
3	20-30 years	145	15.9
4	>30 years	83	9.11

Table-1: Age distribution

S. No.	Attributes	No. of patients	Percentage
1	Esotropia	546	59.93
2	Exotropia	334	36.6
3	Dissociated vertical deviation	212	23.27 (21.21% assoc with IOOA and 2.12% assoc. with SOOA)
4	Inferior oblique overaction	206	22.61
5	Superior oblique palsy	11	1.2
6	Duanes retraction syndrome	9	0.98
7	Lateral rectus palsy	6	0.65
8	Third nerve palsy	3	0.32
9	Browns syndrome	2	0.21

Table-2: Relative frequency of strabismus subtypes

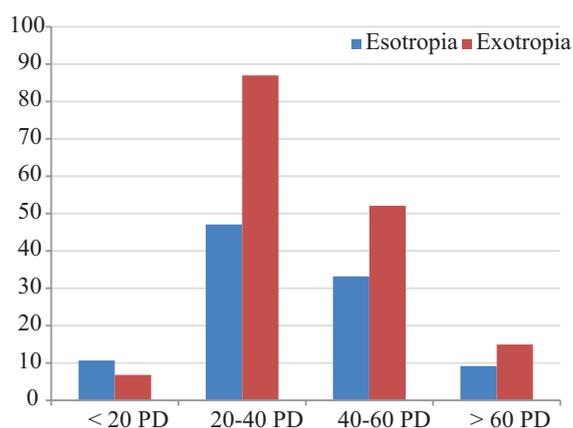


Table-3: Comparison of angle of strabismus

S. No	Esotropia (546 patients)	
1	Accommodative esotropia	146[26.7%]
2	Partially accommodative esotropia	203(37.17%)
3	Essential infantile esotropia	103[19%]
4	Non refractive late onset esotropia	56[10.2%]
5	Sensory esotropia	38[6.9%]

Table-4: Characteristics of esotropia patients

Exotropia (334 patients)	
Intermittent exotropia	194[58%]
Constant exotropia	77[23.05%]
Sensory exotropia	40[11.9%]
Convergence insufficiency	23[6.88%]

Table-5: Characteristics of exotropia patients

Most of literature review of DVD gives estimates of its correlation to congenital esotropia. The figures range from

50 to 90% as per different researchers. The occurrence of DVD in more common forms of strabismus, such as accommodative esotropia and intermittent exotropia, is poorly documented. Cherfan et al calculated a prevalence of DVD as 3.4% in accommodative esotropia and 1.8% in intermittent exotropia.³³ Kutluk et al found DVD to be more common in cases of sensory esotropia than in sensory exotropia.³⁴ We observed DVD in 23.27% of our patients.

As per our study results, 35.89% patients with a manifest deviation had amblyopia. Our study results concur with those of Robaei et al who observed 37.5% of patients with strabismus or a history of strabismus surgery had amblyopia.³⁵ Chia et al in their study on Singaporean Chinese children estimated that 15% of strabismic patients were amblyopic.³⁶ Our conclusions are on expected lines, as in this part of the world, parents generally seek medical attention for strabismus quite late, failing to realize the catastrophic impact of amblyopia. Chaudhry et al have found a delay of 2 years in presentation of strabismus to medical professionals.²⁶

CONCLUSION

Being a single centre study conducted at a tertiary care referral hospital, our study had several limitations. Any type of prevalence estimation was not feasible for us because of expected referral bias. We included all age groups as well as forms of strabismus, so as to study the profile of strabismus in this particular region. Kashmir valley is home to ethnically and racially distinct population. Our study is the first of its kind in the estimation of strabismus burden in the native population.

REFERENCES

- Collins English Dictionary. Copyright ©Harper Collins Publishers.
- Jing Fu, Shi Ming Li, Luo Ru Liu, Jin Ling Li, Si Yuan Li, Bi Dan Zhu, He Li, Zhou Yang, Lei Li, Ning Li Wang and the Anyang Childhood Eye Study Group. Prevalence of Amblyopia and Strabismus in a Population of 7th-Grade Junior High School Students in Central China: The Anyang Childhood Eye Study (ACES). *Ophthalmic Epidemiology*, 2014; 21:197-2.
- Matsuo T, Matsuo C. The prevalence of strabismus and amblyopia in Japanese elementary school children. *Ophthalmic Epidemiol* 2005;12:31-6.
- Attada TR et al. Strabismus in paediatric age (3-16 year): a clinical study. *Int J Res Med Sci*. 2016;4:1903-1909.
- P. A. Graham: Epidemiology of strabismus. *Brit. J. Ophthalmol* 1974;58:224.
- Karlica D, Galetović D, Znaor L, Bucat M. Strabismus incidence in infants born in Split-Dalmatia County 2002-2005. *Acta Clin Croat*. 2008;47:5-8
- Hatt SR, Leske DA, Kirgis PA, Bradley EA, Holmes JM: The effects of strabismus on quality of life in adults. *Am J Ophthalmol*. 2007;144: 643-647.
- Menon V, Saha J, Tandon R, Mehta M, Khokhar S: Study of the psychosocial aspects of strabismus. *J Pediatr Ophthalmol Strabismus*. 2002;39: 203-208.

9. Olitsky SE, Sudesh S, Graziano A, Hamblen J, Brooks SE, Shaha SH: The negative psychosocial impact of strabismus in adults. *J AAPOS*. 1999; 3: 209-211.
10. Nelson BA, Gunton KB, Lasker JN, Nelson LB, Drohan LA: The psychosocial aspects of strabismus in teenagers and adults and the impact of surgical correction. *J AAPOS*. 2008;12: 72-76.
11. Geraldo de Barros riBeiro, Ana GaBriela Zum Bach, Camila Maia Faria, SuZe Anastásia, Henderson Celestino de Almeida: Quality of life of patients with strabismus *Qualidade de vida em pacientes estrábicos*. *Arq Bras Oftalmol*. 2014;77:110-3.
12. Mills, M. D., Coats, D. K., Donahue, S. P., and Wheeler, D. T. Ophthalmic Technology Assessment Committee Pediatric Ophthalmology Panel. Strabismus surgery for adults: a report by the American Academy of Ophthalmology. *Ophthalmology*, 2004; 111: 1255-62.
13. Ziakas NG, Woodruff G, Smith LK, Thompson JR. A study of heredity as a risk factor in strabismus. *Eye*. 2002;16:519-521.
14. Mansooreh Bagheri, Majid Farvardin, Mostafa Saadat: A study of consanguineous marriage as a risk factor for developing comitant strabismus. *J Community Genet* 2015;6:177-180.
15. Nicoline E Schalijs-Delfos, Mieke E L de Graaf, Willem F TreVers, J Engel, Bernard P Cats: Long term follow up of premature infants: detection of strabismus, amblyopia, and refractive errors. *Br J Ophthalmol* 2000;84:963-967.
16. Mohny BG, Erie JC, Hodge DO, Jacobsen SJ: Congenital esotropia in Olmsted County, Minnesota *Ophthalmology*. 1998;105:846-50.
17. M. Abrahamsson, G. Magnusson and J. Sjöstrand. Inheritance of strabismus and the gain of using heredity to determine populations at risk of developing strabismus. *Acta Ophthalmol. Scand*. 1999; 77: 653-657.
18. Akpe BA, Dawodu OA, Abadom EG. Prevalence and pattern of strabismus in primary school pupils in benin city, Nigeria. *Niger J Ophthalmol* 2014;22:38-43.
19. Yu CB, Fan DS, Wong CY, Lam DS. Changing pattern of strabismus: A decade of experience in Hong Kong. *Br J Ophthalmol* 2002;86:854-6.
20. Mohny BG. Common forms of childhood strabismus in an incidence cohort. *Am J Ophthalmol*. 2007;144:465-7.
21. Amorin Garcia C, Carlos A, Araken B, Fernando O. Prevalence of strabismus among students in Natal-Brazil. *Arq Bras Oftalmol* 2004;67:791-4.
22. Chia A, Roy L, Seenyen L. Comitant horizontal strabismus: an Asian perspective. *Br J Ophthalmol* 2007; 91:1337-40.
23. Ebana mvogo C, Bella- Hiag AL, Espesse M. Strabismus in Cameroon. *J Fr Ophthalmol*. 1996; 19: 705-709.
24. David S. Friedman et al: Prevalence of Amblyopia and Strabismus in White and African-American Children Aged 6 through 71 Months: The Baltimore Pediatric Eye Disease Study. *Ophthalmology*. 2009;116:2128-34.e1-2.
25. Katherine A. Garvey, Velma Dobson, Dawn H. Messer, Joseph M. Miller, Erin M. Harvey. Prevalence of strabismus among preschool, kindergarten, and 1st grade tohono o'odham children. *Optometry*. 2010;81:194-199.
26. Tanveer A Chaudhry, Aziz Khan, Muhammad Bilal Salman Khan, Khabir Ahmad: Gender differences and delay in presentation of childhood squint. *J Pak Med Assoc* 2009;59.
27. Njambi L, Rita O, Kazim D, Sonia V. Prevalence and pattern of manifest strabismus in paediatric patients at CCBRT, Dar es Salaam, Tanzania *Journal of Ophthalmology of Eastern Central and Southern Africa* 2017;13:23-30.
28. Taha AO, Ibrahim SM. Prevalence of manifest horizontal strabismus among basic school children in Khartoum City, Sudan. *Sudanese J Ophthalmol* 2015;7:53-7.
29. Abeba Tekle Giorgis, Abebe Bejiga. Prevalence of strabismus among pre-school children community in Butajira Town. *Epidemiology of Pediatric Strabismus (Ethiopian Journal of Health Development*, 2001;15:125-130.
30. Rachael H, Jenkins DB. Demographic variations in the prevalence and management of exotropia. *Am Orthopt J* 1992;42:82-7.
31. Robaei D, Rose KA, Kifley A, et al. Factors associated with childhood strabismus: findings from a population-based study. *Ophthalmology* 2005;113:1146-53.
32. Capo, H., Mallette, R. A., and Guyton, D. L. Overacting oblique muscles in exotropia: A mechanical explanation. *Journal of Pediatric Ophthalmology and Strabismus* 1988;25:281-285.
33. Carole G. Cherfan, MD, Nancy N. Diehl, BS, Brian G. Mohny. Prevalence of dissociated strabismus in children with ocular misalignment: a population-based study. *J AAPOS*. 2014;18:23-29.
34. Kutluk S, Avilla CW, von Noorden GK. The prevalence of dissociated vertical deviation in patients with sensory heterotropia. *Am J Ophthalmol*. 1995;119:744-7.
35. Robaei D, Rose KA, Ojaimi E, Kifley A, Martin FJ, Mitchell P. Causes and associations of amblyopia in a population-based sample of 6-year-old Australian children. *Arch Ophthalmol*. 2006;124:878-84.
36. Audrey Chia, Mohamed Dirani, Yiong-Huak Chan, Gus Gazzard, Kah-Guan Au Eong, Prabakaran Selvaraj, Yvonne Ling, Boon-Long Quah, Terri L. Young, Paul Mitchell, Rohit Varma, Tien-Yin Wong, and Seang-Mei Saw. Prevalence of Amblyopia and Strabismus in Young Singaporean Chinese Children. *Investigative Ophthalmology and Visual Science* 2010;51:23-29.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 20-05-2018; **Accepted:** 21-06-2018; **Published:** 02-07-2018