

# FREQUENCY OF REFRACTIVE ERRORS IN CHILDREN VISITING EYE OUT PATIENT DEPARTMENT AGENCY HEAD QUARTER HOSPITAL LANDI KOTAL

Mohammad Junaid Sethi, Sadia Sethi, Rashid Iqbal

Department of Ophthalmology Lady Reeding Hospital & Khyber Teaching Hospital and  
Community Medicine Khyber Girls Medical College, Peshawar, Pakistan

## ABSTRACT

**Background:** Refractive errors in children are one of the leading causes of preventable blindness. Prevalence of various refractive errors in children is alarming. The purpose of this study was to find the frequency of refractive errors, identify their types, and suggest guidelines for early diagnosis and treatment.

**Material & Methods:** It was a descriptive study conducted at Agency Head Quarter Hospital Landi Kotal from January 2006 to December 2007. Five hundred children visiting eye OPD with refractive errors were evaluated. After adequate cycloplegia, standard refraction protocol was followed and detailed ophthalmic examination of every child was carried out.

**Results:** Out of 4974 children 500 (10%) had refractive errors. It was found that 63% patients were male while 37% females, between 1-15 years and about 40% were belonging to educated families. Mean age of children was 6 years. 58% had decreased vision and 68% parents were worried that their children had crossed eyes. 58% children were hypermetropic, 36% myopic, and 6% had astigmatism. All children showed improvement in vision with glasses.

**Conclusion:** Hypermetropia is the most frequent refractive error in children. All the children with refractive errors needed cycloplegic refraction and glasses remain the mainstay of treatment. Mass screening is required for early diagnosis and treatment of children with refractive errors.

**Key words:** Refractive error, Preventable Blindness, Children.

## INTRODUCTION

World Health Organization introduced the global initiative for the elimination of avoidable blindness by the year 2020 known as "Vision 2020". Refractive errors, is one of the priority areas for vision 2020 as they are so common and because corrective spectacles provide a remedy that is cheap, effective and associated with huge functional improvement. Childhood blindness has profound consequences not only for the individual child but also for the family and community. An estimated 1.5 million children are blind worldwide of whom 1 million live in Asia.<sup>1</sup> Pakistan is placed in the middle Easter crescent by WHO and assuming a similar prevalence of childhood blindness in Pakistan (1/1000) there may be 50-60,000 blind children in Pakistan. Refractive errors which account mostly for low vision and visual handicap are the third largest cause of preventable/curable blindness in Pakistan.<sup>2</sup> In one study it was found that refractive errors account for 8% cases of uniocular blindness in NWFP.<sup>3</sup>

The purpose of this study was to find the frequency of refractive errors, identify their types, suggest guidelines for early diagnosis and treatment and to promote awareness among parents, teachers and primary health care workers.

## MATERIAL AND METHODS

In this study 500 children visiting ophthalmology out patient department of Agency Head Quarter Hospital Landikotal were evaluated from January 2006 to December 2007. Patients above 15 and less than one year age and those with hereditary retinal pathologies were excluded from this study. Detailed history about duration of symptoms as well as their complaints regarding decreased vision, difficulty in seeing objects, problem with reading blackboard, eye strain and any abnormal head posture were carefully recorded. The testing and examination protocol included visual acuity measurement, ocular motility /squint evaluation, cycloplegic retinoscopy, and autorefraction and examination of anterior segment and fundus.

Visual acuity was measured with snellen chart, illiterate E chart at 6 meter and Lea charts. Any abnormal head posture like face turn and head tilt were noted. The degree of tropia was measured using the corneal light reflex.

Cover-uncover test and alternate cover test were performed both at 0.5 meter and 6.0 meter with and without glasses.

Anterior segment was examined with slit lamp. For children above 5 years, 3 drops of cyclopentolate 1% was administered, 3 times, 5 minutes apart to each eye and after 45 minutes cycloplegic refraction was performed. For children below 5 years atropine 1% was prescribed, one drop in each eye three times daily for three days. Cycloplegic refraction was performed using a streak retinoscope in a semidark room. Cycloplegic autorefractometer was also performed in all children above three years. Fundus of every child was examined.

The parents were instructed to have the glasses checked once they were dispensed by the optician.

**RESULTS**

Out of 4974 children visiting eye OPD, 500 had different refractive errors out of which 313 (63%) were males and 187 (37%) females. Mean age was 6 years. 370 (74%) children were between 3-10 years, however 50 (10%) were below 3 years while 80 (16%) were between 11-15 years.

Many children, 290 (58%) had decreased vision. 200 (40%) had difficulty in seeing objects significantly affecting their daily routine. 120 (24%)

children complained that they were having problems with reading black board. Eye strain was a frequent problem seen in 270 (54%) children, 340 (68%) parent were worried that their children had crossed eyes. 158 (32%) of children participating in this study were already using glasses but we again performed complete cycloplegic refraction and detailed evaluation. 62 (12%) children had received patching with poor compliance. Presenting visual acuity in better eye was 6/18 or more in 240 (48%) children. Visual acuity between 6/18 to 6/60 was noted in 130 (26%) children and less than 6/60 in 92 (18%) children respectively. After refraction and with corrective glasses in place most of the children showed significant improvement in visual acuity. In 312 (63%) it improved to 6/18 or better. In 63 (13%) children to 6/18-6/60 while in 39 (8%) children vision improved to 6/60 only. In 86 (16%) children visual acuity could not be recorded because they did not understand any of the available visual acuity charts.

In this study hypermetropia was seen in 288 (58%) patients; it was followed by myopia seen in 182 (36%) patients while astigmatism was found only in 30 (6%) children. 230 (46%) children were hyperope between 1 to 4 diopters while 58 (12%) were between 5-10 diopters. 15 (30%) myopes were between 1-5 diopters while pathological myopia 6-10 diopters was seen only in 30 (6%) children. (Figure)

Esotropia was associated with hypermetropia and this relationship could be demonstrated in 180 (36%) children 20 (4%) children were exotropic. Glasses were provided to children who needed them.

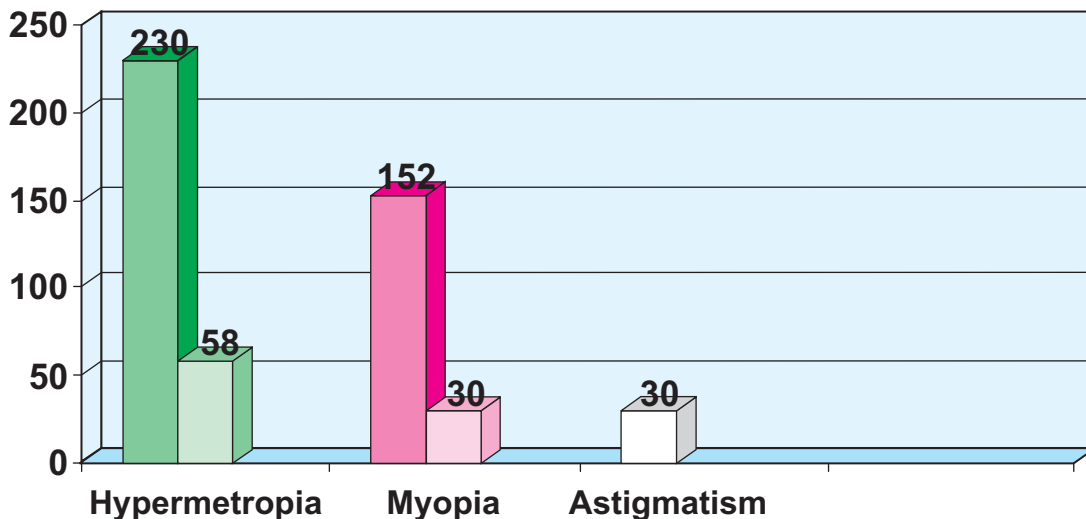


Figure: Showing comparison of refractive errors in children of two genders.

## DISCUSSION

Refractive errors in children is an important public health issue. Clinical evidence suggests that refractive errors along with amblyopia and strabismus, are common in children. Refractive errors can have a substantial impact on the individual. At school age it has a dramatic impact on learning capability and educational potential. The refractive error study in children in China, Chile, and Nepal is the first multicountry population based assessment of refractive errors in children.<sup>4-6</sup> The data reveals that there are significant and large geographic differences in the prevalence of refractive error and that uncorrected refractive errors are very common.

In our study, the reason for not conducting population based survey was that due to limited resources adequate cycloplegia particularly the use of atropine was time consuming and not cost effective and hand held autorefractor was not available. Problem in school screening is that sample is not a true representative of target population because most of our children do not go to school and children of pre-school age are not included in such studies. In our study out of 4974 children 10% had refractive errors. In other studies, conducted at Khyber teaching hospital, Peshawar, it was found that 12.7% children visiting eye OPD had refractive errors<sup>7</sup> and ametropic amblyopia was seen in 6% children.<sup>8</sup>

In this study 500 children with refractive errors were evaluated (50)10% were below 3 years, (370) 74% between 3 to 10 years and (80)16%, between 11 to 15 years. In this study it was found that (313) 63% patients were male while (187) 37% were female. Mainly because our society is a male dominant society. In another study conducted in eye unit Lady Reading Hospital Peshawar Shah<sup>9</sup> also found that 56% patient were male while 44% were female. This was different from multicountry survey of refractive error in children in China, Chile, and Nepal, where both myopia and hyperopia were significantly higher in females than males.<sup>4-6</sup>

In our study (288) 58% were hypermetrope (182) 36% were myope and (30) 6% had astigmatism. In the study done at Mayo Hospital Lahore showed errors of refraction were the third common disorders, affecting 494 children, of which the majority, (63%) were above the age of five, 30% in the one to five age group and only 7% were under the age of one. In the gender distribution major bulk of the cases was males. The cases in this category comprised of hypermetropia (82%), Myopia (13%) and astigmatism (5%). The majority of the children, (54%) were males between the ages of five and fifteen and were affected by hypermetropia.<sup>10</sup>

The study done among school children in Dezful Iran revealed overall rate of myopia in students 15 years of age and younger as 3.4%, hyperopia 16.6% and astigmatism 18.7%<sup>11</sup>. According to Tehran eye study the age and gender-standardized prevalence of myopia based on manifest refraction was 21.8% (95% confidence interval [CI], 20.1 to 23.5) and that for hyperopia was 26.0% (95% CI, 24.5 to 27.6).<sup>12</sup>

The findings were consistent with other refractive errors studies in children in a multi country survey. These findings can also be explained on the natural process of emmetropism that is how immature human eye develops so as to reduce refractive errors. In most newborns eye growth increases initially and then declines over the first year of life. Babies with mild hyperopia often become emmetropic or even myopia when they become older. In a study conducted in China<sup>4</sup> it was found that myopia of -0.5 diopter or less in either eye was essentially absent in 5 years old children, but increased to 36.7% in male and 55% in females by age 15. Over the same age range, hypermetropia of 2 dioptres or greater decreased from 8.8% in males and 19.6% in females to less than 2% in both. Similar results were found in refractive error study in children from La Florida, Chile<sup>5</sup>. However, Shah's<sup>9</sup> study results were similar to this study. He found that 74% patient were hypermetrope while only 6% were myopes.

In this study 46% of patients were hypermetrope between 1-4 dioptres and 12% were between 5-10 dioptres. Myopia between 1-5 dioptres was 30% and 6% patient were high myopes. Shah<sup>9</sup> in his study reports that prevalence of hypermetropia between 1-4 dioptres as 48% while >4 dioptres as 26%. The probable reason of increased prevalence of high refractive error in my study was that children with high error are referred for specialist care to hospital for proper and detailed evaluation.

In this study prevalence of myopia was higher in school going children as compared to illiterate children. Similar findings were described by Seet B et al<sup>13</sup> who have raised concern that rapid rise in myopia prevalence among Singaporeans is related to higher educational attainment. In a study done by Afghani et al in school children found that myopia was three times more common (3.26%) than hypermetropia (0.99%).<sup>14</sup> In this study esotropia was found in 36% of children while exotropia in 4% of children. Sabir<sup>15</sup> also noted in his study that esotropia was 40% and exotropia was 25%. Abrahamsson<sup>16</sup> et al also found in their study that patient with esotropia had pronounced hypermetropia than exotropic cases. They also noted that hypermetropia increased in the deviating eye

in esotropia while the refractive error was stationary in exotropia. The relationship of esotropia to hypermetropia has also been reported by Edlher<sup>17</sup>. However, in multi country survey prevalence of exotropia was more than esotropia<sup>6</sup>. Esotropia is more likely to be amblyogenic than exotropia.<sup>18</sup>

No fundus pathology was found in any patient in this study mainly because of the fact that retinal degeneration are common in pathological myopia and in this study only 6% children had myopia between 5-10 dioptres. In study conducted in China<sup>4</sup> optic disc and retinal abnormalities were observed in 153 eyes of 87 children.

Compliance with glasses was better in children of educated families and 32% of them were already using glasses. There is higher prevalence of refractive errors and associated strabismus and amblyopia in children. At present many such children are treated late or not at all. Mass screening followed by prompt treatment appears only viable solution to this problem.

## CONCLUSION

In this study it was found that hypermetropia is the most frequent refractive error, all these children needed cycloplegic refraction and glasses remain the mainstay of treatment.

Mass screening is required for early diagnosis and treatment of children with refractive errors.

## REFERENCES

1. Oduntan AO. Prevalence and causes of low vision and blindness worldwide. *S Afr Optom* 2005; 64: 44-5.
2. Durrani J. Blindness statistics for Pakistan. *Pak J Ophthalmol* 1999; 15: 1-2.
3. Khan MA, Gulab A, Khan MD. Prevalence of blindness and low vision in North West Frontier Province of Pakistan. *Pak J Ophthalmol* 1994; 10: 39-42.
4. Zhao J, Pan X, Sui R, Munoz SR, Sperduto RD, Ellwein LB. Refractive error study in children: results from shunyi district, China. *Am J Ophthalmol* 2000; 129: 427-35.
5. Maul E, Barroso S, Munoz SR, Sperduto RD, Ellwein LB. Refractive error study in children: results from La Florida, Chile. *Am J Ophthalmol* 2000; 129: 445-54.
6. Pokharel SP, Negerel D, Munoz SR, Ellwein LB. Refractive error study in children: results from Mechi-Zone Nepal. *Am J Ophthalmol* 2000; 129: 436-44.

7. Sethi S, Sethi MJ, Iqbal R. Pattern of common eye diseases in children attending outpatient eye department, Khyber teaching hospital, Peshawar. *J Med Sci* 2008; 16: 99-101.
8. Sethi S, Sethi MJ, Hussain I. Causes of amblyopia in children coming to ophthalmology outpatient department, Khyber teaching hospital, Peshawar. *J Pak Med Assoc* 2008; 58: 125-7.
9. Shah M. Prevalence and presentation of childhood squint (dissertation). Peshawar: Lady Reading Hospital, 1998.
10. Bile ZK, Ahmad S, Khan AA. Spectrum of ophthalmic diseases in children at a referral hospital. *Pak J Ophthalmol* 2007; 23: 33-7.
11. Fotouchi A, Hashemi H, Khiabazkhoob M, Mohammad K. The prevalence of refractive errors among school children in Dezful, Iran. *Br J Ophthalmol* 2007; 91: 287-92.
12. Hashemi H, Fatouchi A, Mohammad K. The age and gender specific prevalence of refractive errors in Tehran: The Tehran Eye Study. *Ophthalmic Epidemiology* 2004; 11: 213-25.
13. Seet B, Wong TY, Tan DTH, Balakrishnan V, Lee KH. Myopia in Singapore: taking a public health approach. *Br J Ophthalmol* 2001; 85: 521-6.
14. Afghani T, Vine HA, Bhatti A, Qadir MS, Akhtar J, Tehzib M, et al. Al-Shifa - Al-Noor (ASAN) refractive error study of one million school children. *Pak J Ophthalmol* 2003; 19: 101-7.
15. Hussain S. Comparison of changes in contrasts function and visual acuity in children undergoing treatment for amblyopia (dissertation). Rawalpindi: Al-Shifa Eye Trust, 1999.
16. Abrahamsson M, Sjostran J. contrast sensitivity and acuity relationship in strabismic and anisometropic amblyopia. *Br J Ophthalmol* 1988; 72: 44-9.
17. A David. *Duke-Elders Practice of Refraction: Refractive errors*. 10<sup>th</sup> ed. London: Churchill Living Stones, 1993: 45.
18. Mohny BG, Huffaker RK. Common forms of childhood exotropia. *Ophthalmology* 2003; 110: 2093-6.

## Address for Correspondence:

Mohammad Junaid Sethi  
33 Defense, Street 4  
Khyber Road  
Peshawar, Pakistan  
Cell: +92 3339182595  
E-mail: drjunaidsethi@gmail.com