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Prevalence and Spectrum of Refractive Errors in Children Attending Out-Patient Department of Ophthalmology, Sher-I-Kashmir Institute of Medical Sciences, Srinagar

Authors
Parvez Ahmad Bhat[1], Jasiya Ishtiyaq[2], Arsalan Un Nisa[3], Walied K Balwan[4], Prince Muzaffar Wani[5]
[1]Senior Resident, Ophthalmology, SKIMS, Srinagar, J&K, India
[2]Senior Resident, Ophthalmology, SKIMS, Srinagar, J&K, India
[3]Postgraduate, Ophthalmology, GMC, Srinagar, India
[5]Senior Resident, Gen. Surgery, SKIMS, Srinagar, India
Corresponding Author
Parvez Ahmad Bhat
Senior Resident Ophthalmology, SKIMS, Srinagar, Jammu and Kashmir, India
Email: *bhatparvez44@gmail.com, Ph: +91-9906483579*

ABSTRACT:

Objective: *To study prevalence and spectrum of refractive errors in children aged between 10 and 16 years who attended the outpatient department of ophthalmology SKIMS Srinagar between July 2014 and June 2015.*

Methods: *All children aged between 10 to 16 years coming to Outpatient Eye Department of SKIMS Srinagar from July 2014 to June 2015 were included in this repetitive study. Detailed ocular examination was performed on each patient. It consisted of visual acuity testing, pupillary reaction, ocular motility examination, anterior segment examination and direct ophthalmoscopy. The refractive error was noted with type and the patients who needed glasses were prescribed glasses.*

Results: *Total of 720 children were examined which included 450 male and 270 female children aged between 10 to 16 years. Out of 720 children, 624 (384 males & 240 females) had no refractive error and in 96 (66 males & 30 females) had varying degree of refractive errors. Myopia was most common type of refractive error seen in 51 (34 males & 17 females), hypermetropia in 35 (25 males & 10 females), Astigmatism in 3 (2 males & 1 female) and mixed refractive error (spherical & cylindrical) in 7 (5 males & 2 females). Among children having refractive error visual acuity of 6/9 was seen in 32 (19 males &13 females), 6/18 in 25 (18 males &8 females), 6/24 in 20 (15 males & 5 females), 6/36 in 15 (11 males & 4 females) and 6/60 in 4 (3 males & 1 females).*

Conclusion: *Refractive errors among children is quite common and need to be assessed at an early stage so that timely spectacle correction can be given to prevent amblyopia and poor performance of children in schools.*

INTRODUCTION

The implementation of programs for the prevention of blindness has been widely recommended by the World Health Organization (WHO) since the 70s[1]. Among the most important factors to be considered regarding prevention of blindness are the ophthalmologic disorders occurring at school age. However, in developing countries, preventive programs are not privileged, probably due to the limitation of available resources in the health area and to the lack of emphasis on health actions[2]. This would in part explain why the prevalence of severe visual deficiency is 10 to 40 times higher in certain areas of developing countries when compared with industrialized countries[3].

The investigation of the prevalence and causes of visual impairment allow the planning of preventive ophthalmologic programs, providing more precise interventions directed to the preservation of ocular health[4]. The purpose of sanitary ophthalmology includes the prevention or attenuation of ophthalmologic diseases or disorders, their complications and consequences, the promotion of conditions for the preservation of normal vision, and the recovery of health through collective measures, motivating the population, but using the community's own resources[5].

According to Sommer, the greatest obstacle to preventive measures is not the lack of adequate technology, but the inability to create favorable conditions to motivate the population, to organize and to facilitate the access to ophthalmologic assistance[6].

Projects aiming at the improvement of vision in children at school age received special attention in the 70s, considering the influence of poor visual performance on the teaching-learning process and on the normal development of the child[7].

The improvement in vision screening performed by adequately trained and supervised nonmedical personnel allowed the identification of the prevalence of visual deficiency among preschool and schoolchildren[8]. The application of simple vision tests, and the observation of ocular signs and symptoms which are indicative of disorders by teachers, was shown to be efficient[9], making the early identification of functional and organic diseases in this population possible. It is also known that early detection of ocular problems in children, such as refractive errors, strabismus, and chronic infections prevents the establishment of permanent damage to visual acuity and binocular vision[10]. The purpose of the present study was to establish the prevalence of refractive errors in schoolchildren.

METHODS

This descriptive study was conducted at eye department SKIMS Srinagar, Jammu and Kashmir. 720 children between 10 and 16 years of age were included in the study. Over a period of 12 months from July 2014 and June 2015 were included in the study. Children who had previous ocular surgery were excluded from the study. The ocular examination included visual acuity measurement, ocular motility, squint detection, pupillary reaction, direct ophthalmoscopy and examination of anterior segment with slit lamp. Visual acuity was measured with Snellen's chart. For every child visual acuity was tested without correction and with correction and if possible with their spectacles. Objective refraction was determined using a Topcon autorefractometer and ocular motility was evaluated with cover test for near and at distance. Cycloplegic refraction was done using cyclopentolate 1% drop three times with 10 minutes interval. All children with uncorrected visual acuity (UCVA) worse than 6/6 underwent subjective refraction. Children whose visual acuity did not improve were referred to consultant ophthalmologist for complete ophthalmic examination to determine the cause of low vision. Appropriate spectacles were provided by the study for those lacking them.

RESULTS

Table 1 shows the age distribution of the 720 children who were screened. Out of 720 children 450 were males and 270 were females.

Table 1: Age Distribution of Children

Age group (years)	Male	Female	Total
10-12	110	90	200
13-14	190	70	260
15-16	150	110	260
Total	450	270	720

Table 2 shows the visual acuity of all the children. It is seen that out of 720 children 624 (384 males and 240 females) showed normal visual acuity of 6/6 and 96 (66 males and 30 females) showed subnormal visual acuity on snellen acuity chart at a distance of 6 meters. 32 children (19 males and 13 females) had visual acuity of 6/9, 25 (18 males and 7 females) had 6/18, 20 (15 males and 5 females) had 6/24, 15 (11 males and 4 females) had 6/36 and 4 (3 males and 1 female) had visual acuity of 6/60. No child had visual acuity of less than 6/60.

Table 2: Visual acuity of Children

V/A	Male	Female	Total
6/6	384	240	624
6/9	19	13	32
6/18	18	07	25
6/24	15	05	20
6/36	11	04	15
6/60	03	01	4
Total	450	270	720

Table 3 shows spectrum of refractive errors seen. Myopia was the most common refractive error seen in 51 (34 males and 17 females) followed by hypermetropia in 35 (25 males and 10 females), mixed spherical and cylindrical error in 7 (5 males and 2 females) and astigmatism in 3 (2 males and 1 female).

Table-3: Spectrum of Refractive errors

Type	Male	Female	Total
Myopia	34	17	51
Hyperopia	25	10	35
Astigmatism	02	01	03
Mixed spherical and cylindrical error	05	02	07
Total	66	30	96

DISCUSSION

This study was designed to find out the frequency of various refractive errors among children with visual impairment. The reason for not conducting population based survey ware limited resources, time requires to reduce adequate cycloplegia, and non-availability of hand held auto-refractor. Problem in school screening is that the sample is not a true representative of target population because most of our children do not go to schools and children of preschool age are not included in such studies.

Refractive errors are among the leading causes of visual impairment worldwide and are responsible for high rates of low vision and blindness in certain areas[11]. The refractive error study in children in China[12], Chile[13] and Nepal[14] is the first multicountry population based assessment of refractive errors in children. The data reveals that there are significant and large geographic differences in the prevalence of refractive errors and that uncorrected refractive errors are very common. The prevalence of refractive error of 13.3% in our study is higher than the percentage of refractive error in China[12] 11.3%, in Chile[13] 9.8%, in Southern Ethopia[15] 11.8%, in Tanzania[16] 6.1%, in Turkey[17] 11% and Baltimore[18] 8.2%.

In our study the prevalence of myopia was 7%, hypermetropia 4.9% and astigmatism 1.4%. The study done among school children in Dezfal Iran revealed overall rate of myopia in students 15 years of age and younger as 3.4%, hyperopia 16.6% and astigmatism 18.7%[19]. The study done by Mingguaing et al showed prevalence of myopia

was 3.3% in 5 year old with retinoscopy and 5.7% with auto-refraction. Hyperopia measured with retinoscopy was present in 16.7% of 5 years olds, 17.0% with auto-refraction. Astigmatism was present in 33.6% of children with retinoscopy and 42.7% with autorefraction[20]. 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). The prevalences based on cycloplegic refraction were 17.2% (95% CI, 15.6 to 18.8) and 56.6% (95% CI, 54.7 to 58.6), respectively. Prevalence of myopia and hyperopia differed significantly among the age and gender groups (P<0.001). Astigmatism of 0.75 dioptre cylinder or greater was present in 29.6% (95% CI, 28.5 to 31.1) of right eyes with manifest refraction and in 30.3% (95% CI, 28.5 to 32.1) with cycloplegic refraction. Among the study population, 6.1% (95% CI, 5.3 to 6.8%) had anisometropia of 1 dioptre or more[21]. In a study done by Afghani et al in school children found that myopia was three times more common (3.26%) than hypermeteropia (0.99%). The overall prevalence of astigmatism was found to be 1.78%. 62% of all refractive errors were upto 2 dioptres majority of the simple myopic children (63%) were found to have refractive error upto 2 dioptre while majority of simple hypermetropic children (55%) had refractive error greater than 2 dioptres. Larger majority of astigmatic error (71%) did not exceed 2 dioptres. Refractive errors are significant cause of visual disability in school children. While primary vision screening by teachers tremendously decreases the workload of ophthalmic staff. Teachers can effectively identify those children with poor vision for refraction and corrective spectacles. Experience of Tayab Afghani study of Al-Shifa in school screening and recommendation by WHO provide standard guide lines for carrying out such programmes at national level[22].

In our study it was found that 450 (62.5%) patients were male while 270 (37.5%) were female. This is different to multicountry survey of refractive error in children in China[12], Chile[13] and Nepal[14] where both myopia and hyperopia were significantly higher in females than males.

In a study conducted in China[12] it was found that the myopia of -0.5D 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 was from 8.8% in males and 19.6% in females to less than 2% in both sexes. Similar results were found in refractive error study in children from La Florida Chile[13].

No fundus pathology was found in any patient mainly because of the fact that retinal degeneration are common in pathological myopia and in this study only 2.3% children had myopia more than 10 dioptres. In study conducted in China[12] optic disc and retinal abnormalities were observed in 153 eyes of 87 patients. 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 majorities of the children, (54%) were males between the ages of five and fifteen and were affected by hypermetropia[23]. In a study done at Department of Ophthalmology, Jinnah Postgraduate Medical Centre Karachi, Pakistan showed that refractive error of 2% was found to be the cause of primary ocular morbidity in children 5-15 years of age[24].

Studies carried out in schools for blind have also reported blindness due to refractive error. For example uncorrected myopia and aphakia were responsible for 3% of blindness among blind school children in Zimbabawe[25]. While uncorrected aphakia and amblyopia were responsible for 5.1% of blindness among blind school children in India[26].

Blindness due to refractive error in any population suggests that eye care services in general in that population are inadequate since treatment of

refractive error is perhaps simplest and most effective form of eye care. Strategies such as vision screening programmes need to be implemented on a large scale to detect individuals suffering from refractive error blindness. Sufficient numbers of personnel to perform reasonable quality of refraction need to be trained in developing countries. Also adequate infrastructure has to be developed in underserved areas of the world to facilitate the logistics of providing affordable reasonable-quality spectacles to individuals suffering from refractive error blindness. Long-term success in reducing refractive error blindness worldwide will require attention to these issues within the context of comprehensive approaches to reduce all causes of avoidable blindness.

CONCLUSION

This study showed that the uncorrected refractive error is a problem among children accounting for major portion of eye diseases. Females were almost equally affected as males. Myopia was the most common problem. Different types of astigmatism were found in children. Some children had other ocular pathologies in association with refractive errors resulting in failure of improvement in vision. There was difference in refractive errors in two eyes in some children resulting in anisometropia. Treatment for refractive errors is perhaps the simplest and most effective form of eye care.

REFERENCES

1. The right to see. WHO Advisory Group urges massive support for prevention of blindness. Rev Int Trach Pathol Ocul Trop Subtrop 1978; 55: 141-1.
2. Temporini ER, Kara-José N. Níveis de prevenção de problemas oftalmológicos: propostas de investigação. Arq Bras Oftalmol 1995; 58: 189-92.
3. World Health Organization. Guidelines for programmes for the prevention of blindness. Geneva, 1979.
4. Thylefors B, Negrel AD, Pararajasegaram R, Dadzie KY. Program for the prevention of blindness. World Health Organization, Geneva, Switzerland, 1995.
5. Galotti O. Oftalmologia Sanitária; conceituação. Rev Bras Oftalmol 1971; 34: 219-23.
6. Sommer A. Organizing to prevent Third World blindness. Am J Ophthalmol 1989; 107: 544-6.
7. Todter F. Ophthalmologische Vorsorgeunstersuchungen bei Kleinkindern. Ost Artzteztg 1975; 30: 1385-7.
8. Temporini ER. Aspectos do Plano de Oftalmologia Sanitária Escolar do Estado de São Paulo. Rev Saúde Pública 1982; 16: 243-60.
9. Kara-José N, Temporini ER. Avaliação dos critérios de triagem visual de escolares de primeira série do primeiro grau. Rev Saúde Pública 1980; 14: 205-14.
10. Brik M. Profilaxia da ambliopia. Rev Bras Oftalmol 1971; 34: 155-218.
11. Dandona R, Dandona L. Refractive error blindness. Bull World Health Organization. 2001; 79: 237-43.
12. Zhao J. Pan X, Sui R, Munoz SR, Sperduto RD, Ellwein LB, et al. Refractive error study in children: results from shunyi district, China. Am J Ophthalmol. 2000; 129:427-35.
13. 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.
14. Pakharel GP, negrel AD, Munoz SR, Ellwein LB. Refractive error study in children: results from Mechi Zone, Nepal. Am J Ophthalmol. 2000; 129: 436-44.
15. Worku Y, Bayu S. Screening for ocular abnormalities and subnormal vision in school children for Batayira Town, Southern Ethopia. Ethop J of Health and Develop. 2002; 16: 165-171.

16. Wedner SH, Rose DA. Myopia in School students in Manza city, Tanzania; The need for national screening programme. Br J Ophthalmol. 2002; 86:1200-6.
17. Lewellen S, Lowdon R, Countright P, Mehl GL. Population based survey of prevalence of refractive error in Malawi; Ophthalmic Epidemiol. 1995; 3: 145-9.
18. Preselan MW, NW A. Baltimore screening project. Ophthalmology 1998; 105: 150-3.
19. 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.
20. Mingguang H, Janwer Z, Yizhi L, Jingjing X, Gopal P, Pokarel, et al. Refractive error and visual impairment in Urban children in southern China. Inves Ophthalmol and Vis Sci. 2004; 45:793-9.
21. Hashemi H, Fatouchi A, Mohammod K. The age and gender specific prevalence of refractive errors in Tehran: The Tehran Eye Study. Ophthalmic Epidemiology. 2004; 11:213-25.
22. 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.
23. Bile ZK, Ahmad S, Khan AA. Spectrum of ophthalmic diseases in children at a referral hospital. Pak J Ophthalmol. 2007; 23: 33-7.
24. Shaikh SP, Aziz TM. Pattern of eye diseases in children of 5-15 years at Bazzertaline area (South Karachi) Pakistan. J CPSP 2005; 15:291-4.
25. Schwab L, Kagame K. Blindness in Africa: Zimbabwe schools for the blind survey. Br J Ophthalmol. 1993; 77: 410-12.
26. Rahi JS. Childhood blindness in India: causes in 1318 blind school students in nine states. Eye. 1995; 9: 545-50.