

## Prevalence and spectrum of refractive errors in children attending out-patient department of Ophthalmology, Government Medical College, Doda, Jammu and Kashmir

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### Abstract

**Introduction:** Uncorrected refractive errors are a common problem in school aged children. The presence of refractive error in school going children affects their physical, mental and behavioral development as well. Inability to detect them at an early stage can adversely impact their learning and academic performance purpose. **Objective:** To study prevalence and spectrum of refractive errors in children aged between 10 and 16 years in the rural population of the Doda district of Union territory of Jammu and Kashmir who attended the outpatient department of ophthalmology GMC Doda between July 2019 and July 2021. **Materials and Methods:** All children aged between 10 to 16 years coming to Outpatient Eye Department of GMC Doda from July 2019 to July 2021 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, cover-uncover test, anterior segment examination and direct ophthalmoscopy. Depending on type of eye disease, they were categorized. Children with defective vision were further examined employing objective refraction using autorefractometer followed by streak retinoscopy after instilling 1% cyclopentolate eye drops. Children with any kind of refractive errors were evaluated and categorized according to the type of refractive error on post-mydratic examination. Children with prior ocular surgery or any ocular disease contributing to diminished VA, manifest strabismus, and pathological myopia were excluded from the study. **Results:** The prevalence of refractive error in this study is 13.4%. Total of 500 children were examined which included 187 male and 313 female children aged between 10 to 16 years. Out of 500 children, 433 (167 males and 266 females) had no refractive error and in 67 (20 males and 47 females) had varying degree of refractive errors. Myopia was most common type of refractive error seen in 35 (11 males and 24 females), hypermetropia in 3 (1 male and 2 females), Astigmatism in 24 (7 males and 17 female) and mixed refractive error (spherical and cylindrical) in 5 (1 male and 4 females). Among children having refractive error visual acuity of 6/9 was seen in 23 (9 males & 14 females), 6/18 in 16 (4 males and 12 females), 6/24 in 14 (3 males and 11 females), 6/36 in 11 (2 males and 9 females) and 6/60 in 3 (2 males and 1 female). **Conclusion:** Refractive error is important cause of treatable blindness in children in the age group of 10-16 years. A larger study needs to be conducted in all the schools of the district to get a clearer picture of refractive errors and other eye-related diseases to detect vision problems as early as possible.

**Keywords:** Mental and behavioral development, refractive error, autorefractometer, cyclopentolate, post-mydratic examination, streak retinoscopy.

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### 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[2].

Vision plays an important role in a child's development for learning and communication[3]. Uncorrected refractive error has become a major challenge to the health care policymakers[4]. An estimated 19 million children are visually impaired worldwide of which 12 million are due to refractive errors which could be easily corrected[5]. While many screening programs in schools are being carried out, there is a lack of accurate data in the prevalence of visual impairment[6].

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[7]. Reliable data on prevalence and distribution of refractive error from population-based surveys are needed to plan cost-effective programs for reduction of visual impairment and blindness. Few population-based data on refractive error are available from India[8].

### Methods

This descriptive study was conducted at Eye Department of GMC Doda, Jammu and Kashmir. 500 children between 10 and 16 years of age were included in the study over a period of 2 years from July 2019 to June 2021. Children who had previous ocular surgery were excluded from the study. Written consents were obtained from the parents of children before the ophthalmic examinations.

After collecting the preliminary data like name, age, class etc. each child was subjected to visual acuity tests. Visual acuity both for distance vision (6 meters) and near vision (33cms) was tested with Snellen's chart under day light illumination. Children wearing spectacles were tested both with and without glasses. Near vision test with standard near vision chart was carried out at a distance of 33cms. Children with visual acuity 6/9 or less were examined in detail. Children with pinhole improvement were subjected to cycloplegic refraction. Children without improvement were further examined for the presence of any ocular pathology. Children who could not read any of the lines of Snellen's chart and without pinhole improvement were listed as doubtful amblyopias and advised referral for further evaluation. After cycloplegia and objective refraction in a semi dark room, the amount and different patterns of refractive errors were estimated. Myopia, hypermetropia and astigmatism in either or both eyes equal to or more than absolute value of 0.5 D were considered for the analysis of data to find out the prevalence of refractive errors in school children. Final prescriptions of glasses

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were given to those children with significant refractive error, after refinement of subjectively verified readings.

### Results

Table 1 shows the age distribution of the 500 children who were screened. Out of 500 children 313 were females and 187 were males.

Age groups	Female	Male	Total
10-12	77	63	140
13-14	132	48	180
15-16	104	76	180
<b>Total</b>	<b>313</b>	<b>187</b>	<b>500</b>

Table 2 shows the visual acuity of all the children. It is seen that out of 500 children 433 (266 females and 167 males) showed normal visual acuity of 6/6 and 67 (47 females and 20 males) showed subnormal visual acuity on snellen acuity chart at a distance of 6 meters. 23 children (14 females and 9 males) had visual acuity of 6/9, 16 (12 females and 4 males) had 6/18, 14 (11 females and 3 males) had 6/24, 11 (9 females and 2 males) had 6/36 and 3 (1 female and 2 males) had visual acuity of 6/60. No child had visual acuity of less than 6/60.

Visual acuity	Female	Male	Total
6/6	266	167	433
6/9	14	9	23
6/18	12	4	16
6/24	11	3	14
6/36	9	2	11
6/60	1	2	3
<b>Total</b>	<b>313</b>	<b>187</b>	<b>500</b>

Table 3 shows spectrum of refractive errors seen. Myopia was the most common refractive error seen in 35 (24 females and 11 males) followed by astigmatism in 24 (17 females and 7 males), mixed spherical and cylindrical error in 5 (4 females and 1 male) and hypermetropia in 3 (2 females and 1 male).

Type	Female	Male	Total
Myopia	24	11	35
Astigmatism	17	7	24
Hyperopia	2	1	3
Mixed spherical and cylindrical error	4	1	5
<b>Total</b>	<b>47</b>	<b>20</b>	<b>67</b>

### 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 were limited resources, time requires to reduce adequate cycloplegia, and non-availability of hand held auto-refractor.

The total prevalence of refractive errors was found to be 13.4% (myopia 7%, astigmatism 4.8%, mixed spherical and cylindrical error 1% and hyperopia 0.6%). Myopia was the most common refractive error (31.1%) followed by astigmatism (29.4%), and hyperopia (2.6%) being the least and many studies have reported similar results[9-14]. In our study it was found that 313(62.6%) patients were female while 187 (37.4%) were male. These results are consistent with the multicountry survey of refractive error in children in China[15], Chile[16] and Nepal[17] where both myopia and hyperopia were significantly higher in females than males.

The prevalence of refractive error of 13.4% in our study is higher than the percentage of refractive error in China[15] 11.3%, in Chile[16] 9.8%, in Southern Ethiopia[18] 11.8%, in Tanzania[19] 6.1%, in Turkey[20] 11% and Baltimore[21] 8.2%. 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 Zimbabwe[22]. While uncorrected aphakia and amblyopia were responsible for 5.1% of blindness among blind school children in India[23]. Strategies such as vision screening programmes need to be implemented on a large scale to detect individuals suffering from visual impairment. Most of this impairment is caused by refractive error, for which treatment is simple, effective, and inexpensive. Sufficient numbers of personnel to perform reasonable quality of refraction need to be trained in developing countries. Provision of good-quality and affordable spectacles should be an integral part of the vision-screening program. An attempt should be made to include

all school-aged children, not just school-attending children, because many of the children in developing countries do not attend schools.

### Conclusion

This study showed that the uncorrected refractive error is a problem among children accounting for major portion of eye diseases. Myopia was the most common problem. Treatment for refractive errors is perhaps the simplest and most effective form of eye care. A larger study needs to be conducted in all the schools of the district to get a clearer picture of refractive errors and other eye-related diseases to detect vision problems as early as possible.

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