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Prevalence of refractive errors among the school-going children in North Kashmir

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Abstract
Purpose: Normal visual acuity plays an important role in a child's development. Uncorrected refractive error (URE) is a major challenge to health care policy makers especially in school going children. We aim to report the prevalence of refractive error among the school students of North Kashmir, India.
Methods: This cross-sectional study was carried out among 762 school children. The screening was conducted in 4 schools of Baramulla district which included primary, middle and secondary schools.
Results: The prevalence of refractive error was 8.5% among which myopia was the most common error present in 30 children, followed by astigmatism in 24 and the remaining 11 with hyperopia. The age group between 14-17 years had high prevalence of refractive error (3.41%). Females had slightly higher refractive error (5.1% than males (4.72%).
Conclusion: The study provides a useful and baseline data about the refractive error amongst the school children of North Kashmir. A larger study needs to be conducted in all the schools of the state to get a clearer picture of RE and other eye related diseases to detect vision problem as early as possible.

Keywords: hyperopia, myopia, prevalence, refractive error

Introduction
Vision plays an important role in a child's development for learning and communication [1]. Uncorrected refractive error has become a major challenge to the health care policymakers [2]. An estimated 19 million children are visually impaired worldwide of which 12 million are due to refractive errors which could be easily corrected [3]. While many screening programs in schools are being carried out, there is a lack of accurate data in the prevalence of visual impairment [4]. Active screening and timely intervention at the right time will not only help in vision restoration but will also influence a child's growth and development [5, 6]. In 1960, the Government of India constituted a school health committee which recommended medical examination of the children at the time of entry into school but this has hardly been in practice in India [7].

Methods
Study Design
This cross-sectional study was conducted among the school children of north Kashmir from July 2022 to September 2022. The study was done under the School Health Program of the National Program for Control of Blindness (NPCB) for identification and treatment of refractive errors. The screening was carried out in 3 schools which included primary, middle and secondary schools.

Study population
A total of 762 children were screened for refractive errors. Permission was taken from the principals of the selected schools. Informed and written consent was obtained from the teachers prior to enrolling the students for the study. Ethical clearance was obtained from the institutional ethics committee.

Eye examination
An eye team consisting of a senior optometrist visited the selected schools. The teachers were selected depending upon the total number of students in the school for the training program organized by the optometrists under the guidance of ophthalmologists. The teachers were sensitized about the magnitude of childhood blindness, their role in the early detection of vision problems, and other eye diseases. They were trained to screen the vision in each eye separately using the Snellen chart in their respective schools and to record questionnaires. An eye health education program was conducted for the students and teachers to make them aware of eye health. The children detected to have any ocular anomaly by the trained teachers were referred first to an optometrist, who did subjective correction by placing the appropriate lenses in the trial frame. The visual acuity tested with the Snellen chart placed at 6 m for any children with refractive errors and for children below 10 years cycloplegic refraction was done using Homatropine 2% eyedrops after 2 h of instilling the drops. Lastly, those who still did not improve were referred to the base hospital for further complete ophthalmic examination by the ophthalmologist.
Refractive errors were diagnosed when the presenting visual acuity was less than 20/40 and improved to >20/40 with correction. Myopia was defined as measured objective refraction of >_-0.5D spherical equivalent in one or both eyes. Hyperopia was considered when the measured objective refraction of >_+2.0D spherical equivalent in one or both eyes was present. Astigmatism was considered when the measured objective refraction of >_0.75 D cylinder was there in one or both eyes. These refractive errors were categorized according to the Refractive Error Study in Children (RESC) Survey group [8]. The data were entered into the Excel sheet and analyzed using the Statistical

Package for the Social Sciences version 16.0 (SPSS Inc, Chicago, IL, USA). The data were expressed as proportions (n, %).

Results

A total of 762 school children were screened from 3 different schools of North Kashmir. Refractive error was highly prevalent in the age group of 14–17 years with 3.41% (*n* = 26) among 218 students followed by 3.14%% (*n* = 24) in the age group 10–13 years in a total of 249 children. However, the age group between 6 and 9 years had comparatively less prevalent refractive errors with 1.96 (*n* = 15) among 295 students [Table 1]. We also observed that increasing age was associated with an increased risk. From a total of 762 students studying in different schools of north kashmir, the prevalence of refractive errors was 8.5% (*n* = 65) among which myopia was the most common with 46.15% (*n* = 30), followed by astigmatism 36.9% (*n* = 24), and the remaining 16.9% (*n* = 11) with hyperopia [Table 2]. Regarding gender, out of 450 males, 4.72.5% (26) had refractive errors whereas 5.1% (39) females had refractive errors from a total of 312 [Table 3].

Table 1: Age distribution of refractive error in school children of North Kashmir

Age group (years)	Total no. of students	Refractive error	%
6-9	295	15	1.96
10-13	249	24	3.14
14-17	218	26	3.41
Total	762	65	8.53

Table 2: Refractive error based on myopia, hyperopia, and astigmatism among the school children

No. of students	Myopia (%)	Astigmatism (%)	Hyperopia (%)
65	30 (46.15%)	24(36.9%)	11(16.9%)

Table 3: Gender distribution of refractive errors in the primary school of North Kashmir

Gender	No. of students examined	Refractive error	Refractive error (%)
Male	450	26	4.72
Female	312	39	5.1
Total	762	65	8.53

Discussion

Screening programs in schools are primarily aimed at detecting refractive errors but the health services provided are inadequate due to the shortage of resources and insufficient infrastructure [10].

We observed that the school children within the age group of 14–17 years were found to be the highest (3.41%) with refractive error and are comparable with many studies indicating that with increasing age, the disease increases [12,13,14]. Girls were mostly affected with (5.1%) refractive errors as compared to boys (4.72%) and many have reported similar studies [15,16]. The overall prevalence of refractive errors in the study was 8.5% which is in consort with the study reported by Warad C *et al* [18]. in Karnataka (6.4%). However, a few studies have reported a higher prevalence and this could be due to multiple factors like population size, geographical locations, and race leading to various disparities [19].

Myopia was the most common refractive error (46.11%) followed by astigmatism (36.9%), and hyperopia (16.9%) being the least and many studies have reported similar results [8, 13, 20, 21, 22, 23].

Conclusion

The study provides useful and baseline data about the refractive errors among the school children of North Kashmir. Refractive error was highly prevalent in among girls, and in between the age group 14–17 years. Our study also focused on students attending monastic schools which generally remains ignored. A larger study needs to be conducted in all the schools of the state 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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Conflicts of interest: There are no conflicts of interest.

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