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1. Compliance with Spectacle Wear and its Determinants in School Students in
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Compliance with Spectacle Wear and its Determinants in School Students in Central India

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Aim: To ascertain the magnitude and causes of compliance and non-compliance with spectacle wear.

Methods: In a cross-sectional qualitative study performed in a school, teachers trained in vision screening examined the students for their visual acuity. The refractionist evaluated their refractive status and prescribed spectacles. Seventy seven students were randomly selected to participate and were revisited in their schools in 2004. Their compliance with spectacle wear was noted and they were interviewed to identify the reasons for compliance or non-compliance. The data were analysed to calculate the frequency and percentage of non-compliance.

Results: Fifteen of 77 students who required spectacles were not wearing spectacles (19.5%; 95% confidence interval, 10.6-28.3). Sex, age, and geographical variation were not statistically significant for compliance. Among students who were compliant with spectacle wear, 75% were wearing spectacles at the time of the visit or had them in their pockets. Clarity of vision with spectacle wear was the main reason for compliance among 75% of the students. Reasons for not wearing spectacles were aversion, headache, breakage, or parents not allowing spectacles.

Conclusions: The refractive services should include follow-up of students with refractive error to ensure compliance with spectacle wear. Counselling of parents, repairing frames, and providing aesthetic frames could improve compliance. Analytical studies with a larger number of participants are recommended.

Key words: Compliance, Eyeglasses, Myopia, Refractive errors

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Introduction

Refractive error is a priority eye disease of the disease control strategy of 'Vision 2020 The Right to the Sight'.¹ Visual impairment and its effect on overall development, especially for children, is associated with compliance with spectacles. To ensure an effective refractive error service, the outcomes of the service need to be monitored, appropriate indicators framed, and operational research conducted.² It is therefore appropriate to study compliance with spectacle wear and to identify the underlying reasons for non-compliance.

Sadguru Netra Chikitsalaya (SNC), Chitrakoot, India, provides eye care services in a tribal belt of Central India.³ SNC provides paediatric eye care to the adjoining districts of Uttar Pradesh and Madhya Pradesh. The residents in the catchment area are poor, and long distances between the villages and government eye hospitals

in the state capitals are major barriers for access to eye care services.

Schoolchildren in 2 regions in Central India underwent vision screening in 2003. Qualified opticians re-examined the students with defective vision. The students in need were provided spectacles and the teachers were educated to advocate spectacle wear. Children with additional ocular pathology were referred to the ophthalmologist at SNC and were provided with spectacles. A study was then conducted to review the compliance with spectacle wear among the students with refractive error and to assess the reasons for non-compliance. Policies for improving vision screening and compliance with visual aids were also proposed.

Methods

Participants

This was a cross-sectional descriptive study. 20,993 children in Karwi in Manikpur Block in Uttar Pradesh and 30,542 children in Satna in Sohawal Block in Madhya Pradesh underwent vision screening in 2003. Students with refractive error were prescribed

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spectacles. A return visit to assess the rate of compliance with spectacle wear was done after 3 to 4 months. This study was performed between February and March 2004.

It was assumed that compliance with spectacle wear in students prescribed spectacles would be 70%. To calculate the compliance of spectacle wear with a 95% confidence interval (CI) and an accepted error margin of 10%, 64 randomly selected students were required to participate in the study. To compensate for absenteeism during the follow-up visit, the number of required participants was increased by 10%. At least 70 students were therefore required to participate in the study. The sample size was calculated by using the STATCALC model of EPI6 software.

To select students for follow-up, a list was made for each school and chits were used to identify the selected students. The teachers used the Snellen illiterate 'E' chart to conduct vision screening for 51,535 students. Students with low vision were referred to an optician who rescreened them. Any student with >0.75 D spherical myopia (unilateral or bilateral) was given spectacles free of charge to avoid amblyopia and asthenopia. 309 students were prescribed spectacles, and 77 were randomly selected to ascertain compliance.

Questionnaire

A pretested data collection form was used to collect the information. A data analyst with experience of retrieving health information from the case records was involved in compiling the information, using Microsoft Excel software. Demographic data included age, sex, and area of residence. The visual acuity, and spherical and cylindrical power of the spectacles for each eye were also noted. Field staff conducted the interviews with the students. Close-ended questions were used to collect the information. The students were asked for 7 reasons for using spectacles. More than one answer for any questions were noted.

Statistical Analysis

The data were analysed using the univariate analysis method with the help of the Statistical Package for Social Studies (version 11). The frequencies and the 95% CIs were calculated. To calculate the 95% CI for the non-compliance rate, the following formula was used:

$$p \pm [\text{sqrt of } \{(p) \times (1-p)/n\} \times 1.96]$$

where p is a fraction of the non-compliance rate and n is the number of students examined to assessing non-compliance.

To ensure the quality of the study, a standardisation workshop was conducted and the data collection forms and methods were piloted. The data were analysed with the help of an experienced epidemiologist and biostatistician.

Table 1. Characteristics of students with refractive error in Central India.

Variable	Students provided with spectacles (n = 309) Number (%)	Students followed up for compliance after 6 months (n = 77) Number (%)
Sex		
Male	178 (57.6)	39 (50.6)
Female	131 (42.3)	38 (49.4)
Age (years)		
<10	60 (19.4)	15 (19.5)
≥10	249 (80.6)	62 (80.5)
Area		
Karwi	105 (34.0)	35 (45.5)
Satna	204 (66.0)	42 (54.5)

The consent of the administrators of SNC to use the school screening records was obtained. The identities of the students were delinked while collecting the detailed information. The outcomes of the study and recommendations to improve compliance with spectacle wear among students with refractive error were discussed with the school authorities and the parents.

Results

The profile of the students with refractive error and those included in the study were compared (Table 1). The group with refractive error closely matched the study population.

Table 2 shows the non-compliance rate according to the demographics of the study population. Nearly 20% of the students who were prescribed spectacles were not wearing them at the time of the follow-up visit (Table 3). The variations in non-compliance between the subgroups were not significant.

Of the 15 students who were not wearing spectacles at the follow-up visit, 5 did not like wearing spectacles, 3 had spectacles with broken frames, 3 experienced headache when wearing spectacles, 1 was not allowed by the parents to wear spectacles, and 2 could not provide a reason. Five students had unilateral myopia of <1 D, 6 had <1 D cylinder, and 4 had a complex refractive error.

Among the 62 students who were wearing spectacles, 20 had refractive error of >0.75 D myopia or >0.5 D hypermetropia, 9 had combined spherical and high cylindrical refractive error in at least 1 eye, 25 had spherical refractive error of <1 D myopia, and the rest had mixed refractive errors.

Discussion

Disability due to not wearing appropriate spectacles could affect the daily activities of a child and can hamper the overall development. Therefore, eye care services that aim to improve the quality of life of children should provide vision screening and refractive services, and ensure that the students comply with the use of visual aids. This study was an attempt to initiate such a system, but it had the

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Table 2. Non-compliance with spectacle wear among students in Central India.

Variable	Number of students examined	Number of students not wearing spectacles	Non-compliance rate (%)	95% Confidence interval
Sex				
Male	39	6	15.4	4.1-26.7
Female	38	9	23.7	10.2-37.2
Age (years)				
<10	15	1	6.7	-6.0-19.3
≥10	62	14	22.6	12.2-33.0
Area				
Karwi	35	6	17.1	4.7-29.6
Satna	42	9	21.4	9.0-33.8
Total	77	15	19.5	10.6-28.3

Table 3. Duration of spectacle wear and reasons for compliance among students in Central India.

	Compliant students (n = 61)* Number (%)	Non-compliant students (n = 15) Number (%)
Duration of spectacle wear (hours/day)		
1-2	1 (1.6)	0 (0)
2-4	3 (4.9)	0 (0)
4-6	13 (21.3)	0 (0)
6-8	1 (1.6)	0 (0)
>8	43 (70.5)	1 (6.7)
Missing information	0 (0)	14 (93.3)
Changes brought about by spectacle wear		
Clear vision	44 (72.1)	7 (46.7)
Relief from headache	7 (11.5)	2 (13.3)
Relief from tearing	0 (0)	0 (0)
Improved academic activities	2 (3.3)	0 (0)
Good performance in sports	0 (0)	0 (0)
Looking beautiful	4 (6.6)	0 (0)
No change	0 (0)	0 (0)
Others	0 (0)	0 (0)
Missing information	2 (3.3)	6 (40.0)

* One student could not complete the study due to illness.

limitations of a small number of participants and only 1 follow-up visit for observation 3 to 4 months after providing spectacles. The students, parents, and school authorities were given sufficient time to advocate spectacle wear, but some of the schools for which these services were carried out near to the end of the project might not have had sufficient time to procure spectacles and promote their use. However, as there was no clustering of non-compliant students in schools that received these services at the end of the project, this factor of variable advocacy could not be responsible for non-compliance. All students with refractive errors were given spectacles at no cost during the project. Therefore, cost was not a barrier to compliance with spectacle wear.

The compliance rate may have been low as this was the first time for this type of project in the area, and due to the poor socioeconomic and education status of the parents. The compliance rate was low when compared with the rate reported in studies in areas with better living standards and health awareness.^{4,5} Provision of free spectacles in this study area might have led to better compliance. As unilateral myopia of 1 D without symptoms

may not need spectacles, the policy of providing spectacles may have to change as compliance among these students might be lower than expected.

The small number of participants for subgroup trends did not permit comparison of compliance by sex, age, or area of residence. As the study area is a tribal belt and the average family income less than US\$50 per month, analysing compliance by socioeconomic status was also not possible. Further study with a larger number of participants is suggested to identify high-risk groups. More follow-up and monitoring may improve compliance with spectacle wear.

Other studies have observed that over-prescribing of spectacles to schoolchildren is common.⁶ This study confirmed these findings. Therefore, it is important to decide who should be given spectacles in school. Philosophically, it is recommended that spectacles should be provided to all children who need them.⁷ However, for logistics and feasibility purposes, the vision screening policies recommended by the World Health Organization should be adopted — spectacles should be provided to people with myopic refractive error of more than 0.75 D and hypermetropic refractive error without symptoms

of more than +0.5 D.² Similar criteria for provision of spectacles should be applied in this study area. This would not only reduce the cost of the project but also increase compliance with spectacle wear. Students with high-power refractive error comply better than those with low-power refractive error, a unilateral problem, or astigmatic refractive error in 1 eye. Therefore, in addition to clinical judgment, the perception of spectacle use should be taken into account when evaluating compliance with spectacle wear.

How one looks when wearing spectacles was a major deciding factor for students to use spectacles. Providing wider choices of spectacle frames might reduce non-compliance for aesthetic reasons. This approach should be complimented with appropriate counselling of spectacle wearers. The aesthetic problem was mostly encountered among girls and their parents, who believed that by wearing spectacles, the girl's marriage prospects might be negatively affected. Changing such attitudes needs patience and counselling.

Maintaining the spectacles and arranging for mending after breakage should be part of the refractive services responsibilities.⁸ This could improve the compliance rate among a community where distance and cost are barriers to using eye care facilities.

One study found that improvement in vision had little or no relationship with compliance.⁹ This was also observed in this study, in that students with unilateral refractive error and astigmatism of <1 D were less compliant than students with high refractive error. However, the element of chance cannot be ruled out in this observation.

This was the first study of the provision of refractive services to this underprivileged population in Central India. It has enabled

revision of the strategies of the service. Limiting provision of spectacles to students with >1 D myopia, >0.5 D hypermetropia, or symptoms of eye strain could further improve compliance with spectacle wear. The refractive services should be complemented by appropriate counselling of the students, and their teachers and parents. Follow-up of students prescribed spectacles should be an integral part of monitoring the refractive services in the future.

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