

## Compliance of spectacle wear among school children

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**Purpose:** In India, school eye screening is an important component of the National Programme for the Control of Blindness providing spectacles free of cost to children from primary section. The primary aim of this study was to know the compliance of wearing spectacles provided during school screening program and to find out reasons for noncompliance. The secondary aim of this study was to get information regarding the types of modifications required in the school eye screening program to improve the compliance level. **Methods:** It was a cross-sectional follow-up study involving school children of age group 10–16 years, class 5–9 from different parts of the country. Public or private schools were randomly selected based on their distance from the base hospitals/partner organizations. Data were collected by standard format directly from the students after informed written consent from school principal or class teacher. **Results:** The utilization of spectacles was found to be only 29.8% ( $n = 289$ ) within 2 years of receiving the spectacles. Thirty-five percent ( $n = 108$ ) students were using spectacles with less than 0.75 D. Appearance of the frame was a deciding factor. It was observed that the frames provided by the DBCS were especially not liked by the children. Twenty-five percent ( $n = 79$ ) children were found to be wearing adult frames. **Conclusion:** Less than a third of the students were compliant with their spectacle prescription in this study. To improve the compliance, children should not be prescribed spectacles for nonsignificant refractive errors, should be given choices for frames and quality of work being conducted under school screening program needs a review.

**Key words:** Refractive errors, school eye health, spectacle compliance

Refractive errors have emerged as important cause of visual impairment and low vision. Children with refractive errors need special attention because it hampers their psychological growth and leads to learning disabilities due to poor vision.<sup>[1]</sup> Refractive error corrections are very easy to perform and do not need specialized doctor, even paramedical staff can perform refraction and cure the child. Due to the simplicity of the procedure it comes as a surprise that refractive errors go untreated.

School eye screening is an important component of the National Programme for the Control of Blindness (NPCB).<sup>[2]</sup> All the stakeholders involved in school eye screening have been screening multitude of school children for many years. Provision of spectacles is an integral part of the activity. District Blindness Control Society (DBCS) is providing spectacles free

of cost to the children from primary section. The number of spectacles distributed is large and it is increasing. About 192000 teachers were trained in the year 2007–2008 as part of school screening activity. In total 2.72 million children were screened, out of which 1.1 million students were detected with refractive error and 492000 (44% of identified children) were given spectacles the same year. In spite of this large number of spectacle distribution, feedback was received during school screening activity that refractive errors are not comparable to the national figures. However, scientific data to understand the reasons for this discrepancy is lacking. Also, Whether the kids are using these spectacles provided during school health screening or not always remains a question.<sup>[3]</sup>

Gogate *et al.*<sup>[3]</sup> found the following reasons for children to not use spectacles during their study of rural secondary schools of Pune district. Peer pressure: being called names such as ‘chashmish’ by other children; lack of acceptance of spectacles in the community as well as at home; similar colored frame given to all the school children which gave an impression of ‘uniformity’; need for spectacles was not felt, when the refractive power prescribed is less, children do not feel the need of spectacles and do not use them; in rural areas, especially

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for girls, it is believed that a child with spectacles cannot get married easily;<sup>[3-6]</sup> inappropriate refractive error services led to wrong correction wherein the children developed headache, watering etc.<sup>[3,6-9]</sup> Based on this fact, a study was designed and undertaken with the aims and objectives to measure the proportion of noncompliance among children who received spectacles, to understand the reasons for noncompliance among the school children and to get information regarding the types of modifications required in the school eye screening program to improve this compliance level.

## Methods

An institutional ethical committee approval was taken by respective partner organizations and the study was conducted in full accord with the tenets of the Declaration of Helsinki. It was a cross sectional follow-up study involving school children of age group 10–16 years, class 5–9 from different parts of the country involving six partner organizations based on their geographic distribution, local challenges and interest of the organization to get involved in the study. Convenience sampling method was used to collect data from 200 school children of age group 10–16 years by each partner organizations from 168 schools. The private or public schools were selected randomly. A guideline was developed and shared with all the institutions to collect the data in the same manner.<sup>[10]</sup> Everyone was instructed to follow the guidelines verbatim and collect the data properly. The data collection methods were discussed during the meeting. A data collection format was prepared and was followed by everyone. Each organization selected their Ophthalmic Assistants for data collection. They were told to contact the coordinators for clarifications if needed. Each organization was also asked to translate the format and questionnaire in local language if needed. Ophthalmic Assistants were told to carry 0.75 D (+ & -) lenses to assess power of spectacles by neutralization method.

On the first day of data collection, one supervisor from either Society for Education, Welfare and Action- Rural (SEWA Rural) or Sadguru Netra Chikitsayala (SNC) visited the organization to check the quality of the work being done. Data were collected of minimum 200 kids from each partner organization which involved a total of six partner organizations.

All the students of the selected schools, who were refracted and were provided with spectacles at any point of time up to 2 years under the NPCB, irrespective of their actual use of these spectacles have been included in this study. Data were collected from the students directly during the school visit. The students were not informed about the visit and subsequent questions. Informed written consent of the principal or class teacher of all the schools and assent of the children were obtained. Demographic information of the enrolled students was recorded as per standard format during an interview with students in presence of teacher. Direct inspection was done to see if the enrolled student was wearing spectacles. Students not wearing the spectacles were questioned about the whereabouts of spectacles and were asked the reasons for not wearing them. All the students were also asked about the source of spectacles, usage of spectacles and an advantage of wearing spectacles. Compliance was defined as regular use of glasses prescribed for refractive errors including myopia,

hypermetropia and astigmatism, assessed either by observation or by interviewing the children. Also, Power of the spectacles were checked by ophthalmic assistants. Questions were also asked regarding the appearance of the spectacles, especially the type of frames. Information about the quality of the fitting work done was gathered. Quality of the spectacles was recorded; special emphasis was given to the scratches on glasses.

Statistical analysis used: Statistical analysis was performed using the SPSS statistical software version 15.0 (IBM SPSS Software 2010; IBM Corp, New York). Qualitative statistical analysis method is followed in this study. A basic quantitative statistical test was performed to validate the results.

## Results

Six partner hospitals had joined the survey activity. The data from one of the partner did not reach on time and had serious inconsistencies; thus, their data could not be taken into account during analysis other five partners all together had collected 982 records. After data verification, 971 records were found to be useful for data analysis hence these 971 records have been analyzed.

More than 52,000 students had to be approached to get a sample of 982 students who have been prescribed spectacles at some point of time. This is merely 2.17% ( $n = 971$ ) of the total students surveyed. The age of the students varied between 10 to 16 years. It was observed that 35% ( $n = 340$ ) of the students had lost their spectacles and had not bothered to get a new pair till date indicating their indifference in wearing them. At the time of examination, 29.8% ( $n = 289$ ) students were found to be wearing spectacles [Table 1]. This clearly indicates poor utilization of the services offered under school eye examination program. It was also seen that there was no gender discrimination; both boys as well as girls were prescribed spectacles in equal numbers [Table 2]. No statistically significant difference ( $P > 0.05$ ) was found gender wise in the usage of spectacles over long period of time [Fig. 1]. Thirty three percent ( $n = 320$ ) students said that they had received their spectacles from the base hospital. This also suggests that they were motivated to go for eye check-ups. The students received their spectacles from outreach services were 12.9% ( $n = 125$ ). DBCS was the source of supply in about 22% ( $n = 217$ ) of the cases indicating lesser popularity amongst the community [Fig. 2].

Only 27.9% ( $n = 304$ ) students accepted that they would use their spectacles for the whole day. While 35% ( $n = 385$ ) students were found to be using spectacles for less than 4 h per day. When asked directly, 60.8% ( $n = 590$ ) students denied regular use of their spectacles. Students were given various options to choose for the nonuse of spectacles, where multiple responses were allowed. The answer regarding nonavailability of spectacles was chosen by 208 students. This also included lost spectacles, broken glasses and/or broken frames. Response of 150 students was being shy about wearing spectacles. This also included friends calling them names, teasing from relatives, parents not allowing them to wear glasses and disliking spectacles themselves. Minor inconveniences while wearing spectacles were complained by 135 students-such as spectacles were not comfortable, they were getting headaches, their eyes were watering etc. Sixty two students thought they did not need spectacles, 48 students did not give a reason

**Table 1: Observation of students regarding spectacles**

Availability of spectacles	Number of participants	%	Cumulative %
Wearing spectacles	289	29.8	29.8
Not wearing spectacles but have brought them to school	27	2.8	32.6
Not wearing spectacles but have them at home	314	32.3	64.9
Does not have spectacles (Lost)	340	35.0	99.9
Missing data	1	0.1	100
TOTAL	971	100.0	100.0

**Table 2: Gender of the students**

Gender	Number	%	Cumulative %
Boys	481	49.5	49.5
Girls	488	50.3	99.8
Missing data	2	0.2	100.0
Total	971	100.0	100.0

**Table 3: Type of frame worn by students**

Types of frames	Number of participants	%	Cumulative %
Wearing adult frames	79	8.0	8.0
Wearing pediatric frame	237	24.4	32.4
Not wearing spectacles	655	67.6	67.6
Total	971	100.0	100.0

for not wearing spectacles, 16 students complained about wrong prescription [Fig. 3]. It was also found out that only 19.6% ( $n = 190$ ) students went for repeat examination and a new pair of spectacles after that. Amongst these students who went for new spectacles, majority went to the base hospitals. Only about 6.8% ( $n = 13$ ) in this category received their new spectacles from DBCS.

Seventy-five percent ( $n = 237$ ) students were wearing pediatric frames while 25% ( $n = 79$ ) students were wearing spectacles with adult frames [Table 3]. About 61.4% students said that they like the frame that they were wearing. Spectacles which were procured from the base hospital and outreach activities were liked much more (75%) against the spectacles procured from DBCS (43.1%). Among those who said that they did not like their frames, the reasons given were—the frame was small/big, the frame was too heavy, the fitting was loose or they were not comfortable wearing them. Some students even said that they do not like the frame, it was bad looking or the color of the frame was not to their liking. When it came to the quality of the frames, it was observed that only 0.6% students were wearing low quality spectacles. 51.3% spectacle frames were found to be of good quality, 31.3% of excellent quality and 16.8% frames were of an acceptable quality. Quality of glasses were also good (47.5%), excellent (33.5%), acceptable (18%) and poor only for 0.9% of total students. Of the 316 students wearing spectacles at the time of the interview, 34.2% ( $n = 108$ ) students were wearing spectacles with dioptric power  $<0.75D$  [Table 4].

It was also observed that if the power of spectacles was found to be less than 0.75D, than the chances of them being used regularly are 78.7% ( $n = 85/108$ ). However, when the

power is more than 0.75D, the chances of the regular spectacle use is 85.6% ( $n = 178/208$ ). It was further observed that spectacles were used for the whole day (24.1%) if the power was less than 0.75D. Whenever the power was found to be more than 0.75D the spectacle being used for the whole day became 31.7% ( $n = 66$ ). Fifty percent ( $n = 102$ ) of the students with power greater than 0.75D, while 16.7% ( $n = 18$ ) students with power  $<0.75D$  were using spectacles for more than one year [Fig. 4]. Majority (38.5%) of the students had gone to hospitals run by NGOs for their eye check-up. One out of four students (24.9%) had visited government hospital for eye examination, while only about 13.1% students had visited private hospitals. A statistically significant difference ( $P < 0.05$ ) in usage was found in relation to the place of procurement. When the glasses were procured from the base hospital, they were used regularly by 47.6% students. When they were procured from DBCS, they were used regularly by only 25.3% students. The utilization of glasses was found to be 37%, if procured from vision centers and 30% if procured from outreach camps. The study could conclude that school screening coverage is not 100% in any of the areas covered by the partner hospitals. This lack of uniform school screening has resulted in kids not being prescribed glasses/checked for refractive errors.

## Discussion

School children from developing countries such as India,<sup>[11,12]</sup> Nepal,<sup>[13]</sup> China<sup>[14]</sup> and Chile<sup>[15]</sup> have problem of uncorrected refractive errors as the most common cause of visual impairment. These refractive errors can be easily and cheaply corrected by a simple pair of spectacles but only when they are worn. School screening programs are good initiative in this regard but they should be designed in such a way that they prescribe correct spectacles and do a follow-up to make sure that the children are wearing them.<sup>[3,16]</sup> Our study showed that coverage of school screening activity is not 100% in majority of the areas. All the children refracted under this school screening program did not receive spectacles. Overall percentage of children who were prescribed spectacles at some point of time in school screening activity was found to be 2.17% which is much less than the national average of 7.26% of school children wearing spectacles.<sup>[11]</sup> It should also be kept in mind that this sample belongs to secondary school children, where one is expected to find more refractive errors due to more study pressure & use of eyes for near work. Since our study partners are from different parts of the country except Southern India, the percentage of school children having refractive errors need to be reviewed. Twenty five percent students were examined in the government set up and had received their spectacles from DBCS. Forty percent students

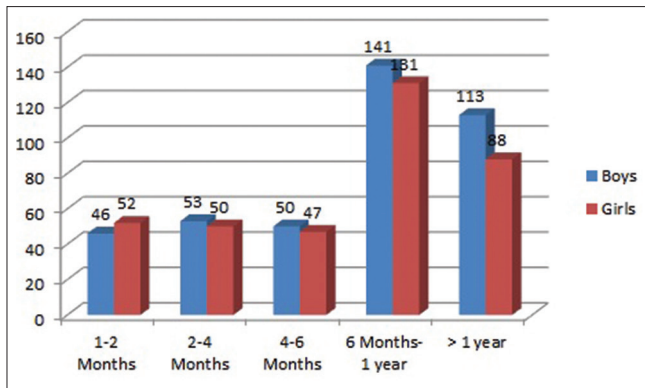


Figure 1: Duration of spectacle usage among boys and girls

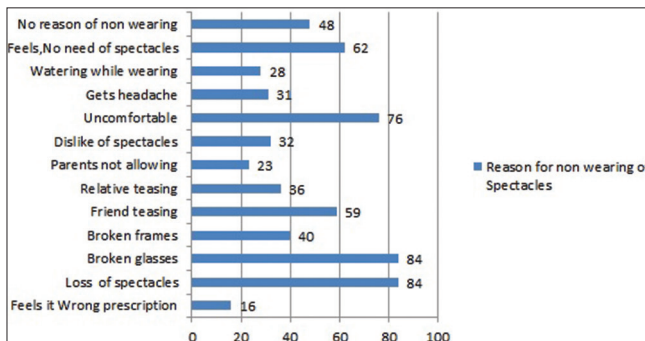


Figure 3: Reasons for nonwearing of spectacles

received their spectacles from base hospitals. This shows the level of awareness among students as well as their parents. DBCS is supposed to be providing spectacles free of cost to the students in primary schools (up to 8<sup>th</sup> standard). However, majority of the students in need of spectacles are actually found in the secondary schools.

Only 29.8% students were found to be wearing spectacles at the time of the survey amongst the students prescribed spectacles. Thus 70% of the time, energy and efforts which are spent behind school screening activity basically go to waste. There was no difference in the prevalence of refractive errors according to the gender of the students. Only 28% of the students use spectacles for the whole day and 31% of students use spectacles regularly which also indicates that the resources spent behind this activity is not put to proper use. This result corroborates with the studies from countries such as China,<sup>[17,18]</sup> Tanzania<sup>[19]</sup> and Mexico.<sup>[16]</sup> Twenty two percent students went for a repeat examination to get new pair of spectacles. Out of which 68% students had gone to the base hospital for a new pair of glasses. This indicates that those students who were motivated enough to go for a regular eye check-up and get new pair of spectacles chose to go to the base hospitals rather than waiting for the next school screening activity. Almost 40% students said that they did not find any advantage in wearing spectacles. As many as 39% students did not like the frames they were wearing. The reasons for this were, the frame was uncomfortable, too big, too small, too heavy, did not like the color, did not like the look etc. Many other studies have also reached to the same conclusion.<sup>[9]</sup> Children need to be given preferences when it comes to choosing spectacle frames. It was also observed

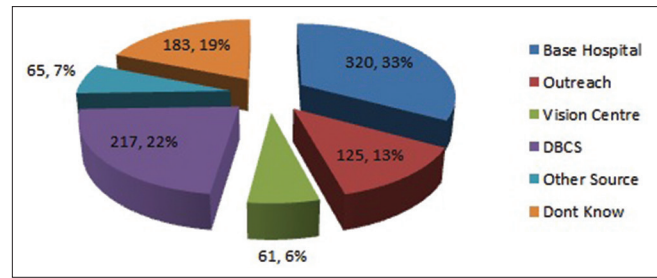


Figure 2: Sources of Spectacles

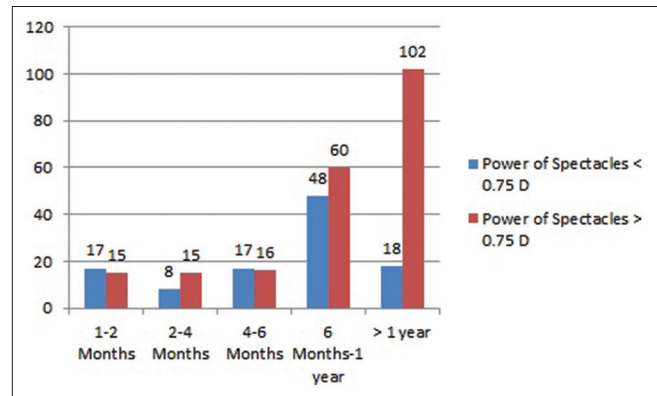


Figure 4: Spectacle compliance depending on power of spectacles

Table 4: Power of spectacles worn by students

Power of spectacles	Number of participants	%	Cumulative %
Not wearing spectacles	655	67.5	67.5
Wearing spectacles of <0.75 D	108	11.1	78.6
Wearing spectacles of >0.75 D	208	21.4	100.0
Total	971	100.0	100.0

that 8% students were wearing adult frames, which should not happen at all. The fitting work and quality of the glasses, however, were found to be good in almost 100% cases. Spectacles which were procured from the base hospital and outreach activities were liked much more (75%) against the spectacles procured from DBCS (43.1%). Thirty four percent students out of the total students wearing spectacles, were wearing spectacles with dioptric power <0.75D. This is a nonsignificant refractive error and the national program should not waste provisions procuring such spectacles. The likelihood of spectacle being used regularly was found to be high, (47.6%) when they were procured from the base hospital, while regular use of the spectacle procured from DBCS was observed to be 25.3%. When the power of the spectacle was more than 0.75D then the chances of them being used regularly was also found to be high by 10%. Similarly if the power is more, chances of spectacle being worn for the whole day was also observed to be more by (8%). If the power was greater than 0.75D then chances of spectacle use was observed to be for more than a year in more than 30% of the students.

Thus the study informs us that spectacles with nonsignificant refractive errors are still being prescribed which should stop. Adult frames are still being given to children that should also

stop. There should be a relook at the screening activities to make sure that children are using the spectacles regularly. Children should be given options to select frames of their choice. Quality of work being conducted under DBCS needs a review. The study was done involving the institutions of various part of the country that was the strength of the study. Sampling methodology and some amount of missing data, though a standard operating procedure had been followed, were the limitations of the study. Also, the compliance might have been reported low due to surprise check as only those actually wearing spectacles at the time of the visit were considered compliant.

## Conclusion

Spectacle wear compliance amongst the school children was less. To improve the compliance, children should not be prescribed spectacles for nonsignificant refractive errors ( $<-0.75D$ ,  $<+2.0D$  or  $<0.5D$  astigmatism), should be given choices for frames and quality of work being conducted under school screening program needs a review. However larger comprehensive study with a pan India representation is needed.

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## Conflicts of interest

There are no conflicts of interest.

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