

## Original Article

### Eye-glasses wear compliance following school-based visual acuity screening in Nepal: a comparative study

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#### Abstract

**Introduction:** Eye-glasses wear compliance is found to be low among children in school-based eye screening programs who are provided spectacles free of charge.

**Methods:** Thirty-six schools from school visual acuity screening program in Nepal were randomly selected to receive no follow-up (standard) or follow-up by an optometry team at 3 months. In the intervention group (that received the follow-up), ophthalmic personal made unannounced visits to the schools at 3 months to determine spectacle compliance. Direct examination to determine compliance with spectacle wear 6 months was done. The primary reason for noncompliance from a list of possibilities was identified using a questionnaire.

**Results:** Among 297 (145 control and 152 intervention) students that received glasses in the 36 schools, 128/152 (84%) were available for examination at 3 months in the intervention group. A total of 216/297 (73%) students were available for examination at 6 months (73 % and 72% of the control and intervention groups, respectively). Within the intervention group, 51% of children at 3 months and 57% at 6 months were wearing glasses during the unannounced visits.

The main source of refractive error was myopia. Out of 66 children with astigmatism, 24 (36%) were wearing glasses. There was no statistically significant difference in compliance ( $p=0.85$ ) between private and public schools, but compliance correlated better with the educational status of careers.

**Conclusion:** A follow-up visit to the school by eye care personnel did not improve spectacle wear compliance among children. Other factors may also be responsible for poor compliance.

**Key words:** Children, Compliance, Spectacles, Visual acuity.

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#### Introduction

One of the main objectives of the World Health Organization's "Vision 2020: The Right to Sight" initiative is the addressing and correction of refractive error in developed and developing countries for as many as 13



million people. A central means of addressing this problem has involved programs to conduct school-based vision screening and testing along with spectacle distribution. However, most programs have reported that at follow-up, the large fraction of children who were provided spectacles for free were not wearing them or found to be noncompliant in wearing refractive correction (Congdon et al, 2008; Gogate et al, 2013). Reasons cited for noncompliance vary by study and population- the most common reasons cited are lost or broken eyeglasses, worried about appearance or teasing, concerns that the eyeglasses will make the eyes worse, and eyeglasses being kept at home or used only for special occasions (Castanon Holguin et al, 2008; Gogate et al, 2013).

Uncorrected refractive error has emerged as the commonest cause of ocular morbidity and important cause of visual impairment in the world and same holds true for Nepal. An estimated 1 million children under 16 years of age (assuming a prevalence in this age group to be 10%, although estimates range from 3% to 20%) have uncorrected refractive error. Even when glasses are prescribed and obtained, children do not wear them because of factors such as stigma, ignorance and negative parental attitudes (Mid-term review VISION 2020: The Right to Sight, 2011).

A 2016 study in Nepal (Bhandari et al, 2016) found that a compliance rate of only 28%, which means that the process of refraction and dispensing is largely a misspent effort and many children will not benefit from a refractive correction. It is thus very necessary to determine the causes of noncompliance.

The Lumbini eye institute and research center provides refractive services to students of primary and secondary schools of the Rupandehi district with the support of SEVA Foundation, Nepal and Orbis, and distributes glasses at free of cost, but prior to the present study, few

data on compliance rates for spectacle wear or reasons for noncompliance were available.

A qualitative study from Southern India reported the possible solutions for improving the compliance (Narayanan et al, 2017). The present study thus aimed to determine whether an intervention visit (solutions of physical barriers from the perspective of students) at 3 months by an ophthalmic team improved compliance with spectacle wear and to investigate reasons for noncompliance.

### **Subjects and Methods**

From a list of schools within Rupandehi district with school screening programs in 2015-2016 determined at their own convenience from medical records at the Lumbini eye institute and research center, a total of 54 schools and 16,888 students were screened.

A list of 54 schools from medical section, 36 were selected randomly (lottery method). Of the 54 schools, 36 were selected (10 public, 26 private) and randomly assigned to either control or intervention groups. The 18 schools in the intervention group received follow-up visits by an ophthalmic team at 3 months and again at 6 months. At 3 months, refractions were reassessed and if needed, spectacles were repaired, refitted or replaced. During the visit, problems such physical barriers from the perspective of students including light weight lenses, well fitted frame of their choice, frames selected based on the individual facial parameters, preventing other students from teasing (discussed with class teachers) and provision of free spectacle were addressed. In contrast, 18 schools in the control group received only a follow-up visit at 6 months.

Data were gathered on age, sex, type of refractive error, type of school (private/public), location (urban/rural) and parental education status. The students studying in school located in Municipality is defined as urban and those studying in Gaupalika are defined as rural.

Permission was obtained from school principals to conduct unannounced inspections to determine spectacle compliance. On the day of inspection, teachers were asked to gather students who had received glasses and direct inspection by visiting optometrist was done to determine the compliance. Children not wearing spectacles at the time of visit were termed noncompliant. Figure 1 shows the enrollment of the school children and assessment of compliance.

All children originally provided spectacles were evaluated at 3 months and 6 months follow up visits by an optometrist using a closed questionnaire.

Visual acuity was tested for all students with or without spectacles with the help of externally-illuminated logMAR charts placed at a distance of 4m. The study was approved by the Institutional Review Committee of the Lumbini Eye Institute and research center and verbal consent was obtained from the school authorities on behalf of the students to participate in the study. Data were entered and were analyzed using SPSS 20 version. Fischer's exact test and linear association were used for statistical analysis and a P value of <0.05 was considered to be significant.

## Results

A total of 297 - 145 in Group A (Control) 152 in Group B (Intervention), students received glasses in the 36 schools. Their median age was 13 years with an inter-quartile range of 4 (range 5-17) in both groups. Girls represented 47% and 54% respectively in Groups A and B.

In Group B (intervention), 128/152 (84%) were present for examination at 3 months. A total of 216/297 (73%) students were available

for examination at 6 months (73% and 72% in Groups A and B, respectively) (Table 1).

The principal reasons for drop out were unable to continue (mainly public), joined university for higher education after tenth grade or change in the school. A total of 39 (27%) and 42 (28%) of the students were either absent, had dropped out or had left school for higher/better education in Groups A and B, respectively.

In Group B (intervention), 51% of children at 3 months and 57% at 6 months were wearing glasses during the unannounced visits and hence labelled compliant. In Group A (control), out of 106 children, 48% were wearing glasses at 6 months (Table 2).

Compliance at 6 months was greater in Group B (57%) than in Group A (48%) but this was not statistically significant ( $p=0.141$ , Fisher's exact test). (Figure 1)

The overall most common cause of noncompliance in both control and intervention was lack of awareness of the need for distance glasses by the children's carers. The main reason cited for noncompliance in Group B was that the students used glasses only sometimes (15 children, 32%), and in Group A that students were worried that spectacles would make their eyes weak (22 children, 40%) (Table 3).

The compliance rate did not differ between private and public schools (52%) but correlated positively with higher education level of carers (linear-by-linear association=0.018). (Table 4) (Figure 2)

At the 6 months follow up, 76/126 (60%) of children with myopia, 14/24 (58%) with hyperopia and 24/66 (36%) with astigmatism were wearing glasses (Table 5).

**Table 1: Characteristics of Children with Correctable Refractive Error**

Group		Intervention (152)		Control (145)
Follow-up visit at		3 months	6 months	6 months
Students available at the time of visit		128 (84%)	110 (72%)	106 (73%)
Female		69 (54%)	59 (54%)	50 (47%)
Age, median (interquartile) (years)		13 (4)		13 (4)
Type of school		22 (17%) public 106 (83%) private		11 (10%) public 95(90%) private
School location	Rural	46 (36%)	34 (31%)	12 (11%)
	Urban	82 (64%)	76 (69%)	94 (89%)
School level	Primary	102 (80%)	87 (79%)	60 (57%)
	Secondary	26 (20%)	23 (21%)	46 (43%)

**Table 2: Spectacle Wear Compliance in relation to gender and school Type**

School	Sex	Intervention						Control		
		3 months			6 months			6 months		
		Yes	No	Total	Yes	No	Total	Yes	No	total
Public	Male	0	7	7	2	0	2	2	4	6
	Female	5	10	15	4	4	8	3	2	5
	Sub-total	5	17	22	6	4	10	5	6	11
Private	Male	33	19	52	28	21	49	19	31	50
	Female	27	27	54	29	22	51	27	18	45
	Sub-total	60	46	106	57	43	100	46	49	95
<b>Total</b>		<b>65</b> <b>(51%)</b>	<b>63</b> <b>(49%)</b>	<b>128</b> <b>(100%)</b>	<b>63</b> <b>(57%)</b>	<b>47</b> <b>(43%)</b>	<b>110</b> <b>(100%)</b>	<b>51</b> <b>(48%)</b>	<b>55</b> <b>(52%)</b>	<b>106</b> <b>(100%)</b>

**Table 3: Reasons Cited for Spectacle Wear Noncompliance**

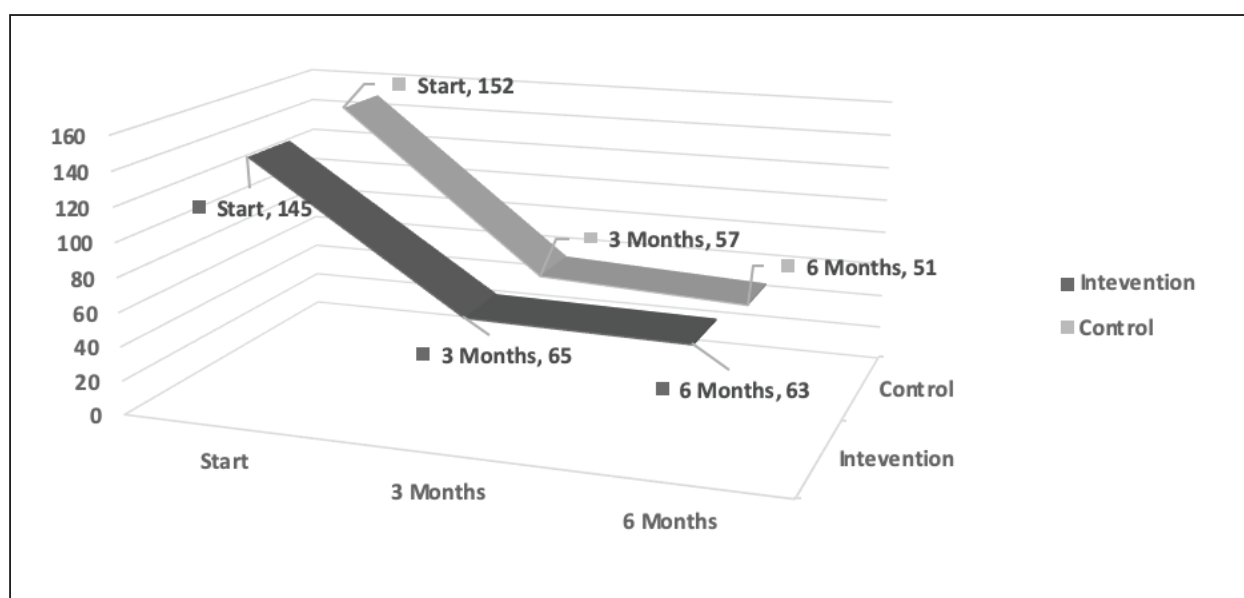
Primary reason for spectacle wear noncompliance	Intervention (B)		Control (A)
	3 months	6 months	6 months
Spectacles broken	5	1	2
Spectacles lost	4	0	0
Forgot spectacles at home	1	0	0
Did not feel spectacles are needed	1	1	0
Spectacles caused headache	1	0	0
Vision not clear with spectacles	5	1	0
Uses spectacles only some of the time	14 (22%)	15 (32%)	19 (35%)
Concerned about teasing and looks	5	2	2
Worried spectacles will make eye weak	8 (13%)	8	22 (40%)
Parents disapprove of spectacles	7	9 (19%)	8 (15%)
Did not like the spectacles	12(19%)	10 (21%)	2
<b>Total</b>	<b>63/128</b>	<b>47/110</b>	<b>55/106</b>

**Table 4: Spectacle wear compliance with education level of students at 6-month follow-up**

Education Level	Status of students wearing spectacles at 6 months		Total
	Compliant	Non-compliant	
Illiterate	8	10	18
	44.4%	55.6%	100.0%
Primary	4	5	9
	44.4%	55.6%	100.0%
Secondary	20	28	48
	41.7%	58.3%	100.0%
High school	27	31	58
	46.6%	53.4%	100.0%
College	54	29	83
	65.1%	34.9%	100.0%

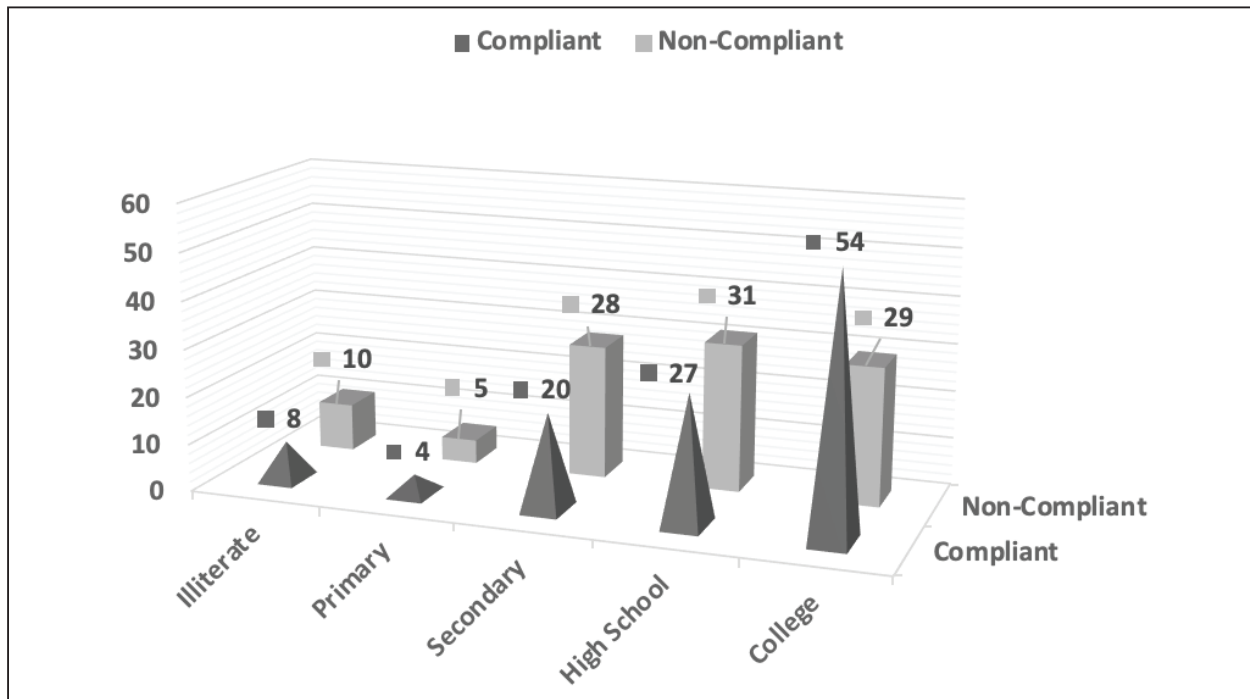
**Table 5: Spectacle Wear Compliance at 6 months follow up with Refractive Error type**

Refractive Error	Spectacle wear compliance		Total	P value
	Yes	No		
Low Hyperopia	11 (79%)	3 (21%)	14	<0.001
Medium hyperopia	0 (0%)	4 (100%)	4	
High hyperopia	3 (50%)	3 (50%)	6	
Low myopia	47 (50%)	47 (50%)	94	
Medium myopia	15 (83%)	3 (17%)	18	
High myopia	14 (100%)	0	14	
Astigmatism	24 (36%)	42 (64%)	66	
<b>Total</b>	<b>114 (53%)</b>	<b>102 (47%)</b>	<b>216</b>	



**Figure 1: Graph illustrating over all compliance in the intervention and control group**





**Figure 2:** Spectacle wear compliance among patients with education level in their parents

### Discussion

Compliance with spectacle wear was found to be 51% at 3 months and 57% at 6-month unannounced visits in one group and 48% were found wearing glasses in another group at 6-month unannounced visits. Here, compliance was improved by 9% through the impact of ophthalmic visits (new refractions, repair and replacement of spectacles).

At the 3-month intervention, out of 65 children wearing glasses, 4 spectacles in poor condition were replaced. Out of 63 children not wearing glasses, 5 had broken spectacles, 4 had lost spectacles and 5 children did not feel clear with spectacles. All these children were refracted again and prescribed new spectacles. But at follow-up, this intervention did not show any improvement in the compliance, hence denoting that there could also be other factors which may also be needed to be evaluated but is beyond the scope of the paper.

A study done in Southern India (Narayanan A, Kumar S and Ramani KK, 2017) had provided some interventions which they believed could

improve spectacle compliance and highlighted the role of the class teacher. Other authors have also reported that class teachers are effective in improving spectacles compliance (Reddy PA, 2015). All class teachers also had a very strong connection with their students and their parents.

A study in South India among school children of 7-15 years found a compliance of 57.8% during unannounced visits conducted after 3 months of providing spectacles free of cost (Dawn et al, 2012). In another study done in Saudi Arabia, the compliance was also found to be relatively small (33.12%) (Aldebasi, 2013). This was also similar with another study by Holguin et al (Castanon Holguin et al, 2008) who also reported only 30% spectacle compliance of school children in Mexico. Gogate et al (Gogate et al, 2013) also reported 29.5% compliance in school children in India.

However, Khandekar et al (2002) in their study have reported more than 50% or half the participants wearing their spectacles at the time of follow-up. Higher compliance was thought

to be attributed by involving class teachers for monitoring their students.

Bhandari et al (2016) found the compliance with wearing spectacles in school children of Chitwan district in Nepal to be 28% at one year after the provision of free spectacles. This suggested that although the compliance may seem better at earlier follow-ups, if same is done for longer duration, the compliance rate of spectacle could indicate a decrease.

In our study, spectacle wear compliance was 48% in boys and 58% in girls, similar to that found by studies from Oman (Khandekar and Al Raisi, 2002), South Africa (Congdon et al, 2008) and India (Gogate et al, 2013). All of the above studies including ours tend to report that girls are more compliant in wearing spectacles than boys.

In our study, we found that the compliance increased with the education level of the parents ( $p=0.008$ ) but compliance was similar between children in private and public schools ( $p=0.988$ ).

Aldebasi (2013) reported that one of the major reasons for not wearing spectacles were parental disapproval followed by the children not liking the spectacles, and breakage. In our study, parental disapproval, dislike for spectacles in children, only occasional of the spectacles and the concept that spectacles would weaken the eyes further were found to be the main reasons for poorer. Messer et al (2012) reported in their study that even after provision of 2 free spectacles, breakage or loss was the main reason for not wearing spectacles by 80% of American participants – which could reflect the major reason for non-compliance in more developed part of the world.

Children prescribed spectacles in a clinical setting may be more likely to wear their spectacles than children recruited in school vision screenings because of the presence of carers and optometrists who are able to explain

and demonstrate the need for the child to wear the spectacles (Messer Dawn et al, 2012). This could hold true in our study for lower compliance rate as the patients were prescribed in the school settings. This however opens new doors for future studies for later researches to evaluate if the compliance in patients provided spectacles at the hospital and in school setting are significantly different.

### Conclusion

Follow-up visits to the school by eye care personnel alone was not found to be effective in improving spectacle wear compliance in children. Many other factors could be responsible for poorer compliance – which may include careers' disapproval, their dislike for wearing spectacles, the worry that the use of spectacles will weaken their eyes, and a feeling that the spectacles were not needed. All of these are societal issues should also be given emphasis and importance while prescribing glasses or during follow-ups.

### Recommendations

Teachers are the front-line measures who could improve the spectacles compliance among the students. Measures to strengthen the willingness of children to accept refractive correction should include educating the students and their careers and recommending schools to conduct follow-up visits after school screening programs at the hospital.

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