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Original Research Article

Factors affecting non-compliance to spectacle wear in children aged six years and below with refractive errors: A hospital based cross-sectional study in India

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ABSTRACT

Context: Uncorrected refractive errors (RE) are the most common cause of preventable visual Impairment (VI) in children, which if not treated in time can lead to amblyopia. VI in early childhood interferes with their overall development affecting their future opportunities in life. Spectacles remain the most popular and effective method for correction of RE. Children unlike adults, often don't understand the need for wearing spectacles, thus prescribing spectacles in children becomes difficult.

Aims: Aim of this study was to find out proportion of spectacle wear non-compliance in children aged six years and below and identify factors associated with it.

Materials and Methods: The study was conducted among 115 children aged six years and below with refractive errors who were prescribed spectacle correction. Children were selected using simple random sampling.

Multivariate logistic regression was used to identify independent factors associated with spectacle wear non-compliance.

Results: Proportion of spectacle wear non-compliance was 53.04%. Children with spectacle wear non-compliance were more likely to: belong to age of two to four years (AOR = 4.3; 95%CI: 1.3-14.3); have mother with up-to primary school education (AOR = 3.7; 95%CI: 1.2-11.7); have anisometropia (AOR = 11.1; 95%CI: 3.4-36.7). Statistically significant association was observed between spectacle wear non-compliance and child's age, mother's education, anisometropia, astigmatism, manifest squint, intolerance to glasses, glasses lost, glasses broken, concerned teasing and cost issues.

Conclusions: Children less than four years of age; with anisometropia and those whose mothers had up-to primary school education were more likely to be non-compliant to spectacle wear.

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1. Introduction

Uncorrected refractive errors (RE) are the most common cause of preventable Visual Impairment (VI) in children, which if untreated can lead to amblyopia.¹ Spectacles remain the most popular and effective method for correction of RE.¹ VI in early childhood interferes with their overall development affecting their future opportunities in life.^{2,3}

Children unlike adults, often don't understand the need for wearing spectacles, thus prescribing spectacles in children becomes difficult.

There are limited studies done on non-compliance to spectacle wear in children belonging to the age group of six years and below. "Eye Health for All" and prevention of VI through provision of comprehensive universal eye-care services and quality service delivery, is one of the main objective of National Programme for Control of Blindness. Keeping this in mind, we conducted this study

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to find out proportion of spectacle wear non-compliance in children aged six years and below and identify factors associated with it in order to give suitable recommendation for achieving maximum compliance to spectacle wear and preventing VI.

2. Materials and Methods

A hospital-based cross-sectional study was conducted in 115 children aged six years and below with refractive errors who were prescribed spectacle correction. After obtaining approval from Institutional Ethics Committee, the study was conducted in Ophthalmology Out Patient Department (OPD) of a Government Medical College of India for a period of 12 weeks, starting from May 2018 to July 2018.

A list of eligible children registering at Ophthalmology OPD was prepared during OPD days (i.e. twice a week) for a period of 12 weeks (i.e. total 24 OPD days). Due to time constraint, each OPD day, five study participants were selected by Simple Random Sampling using lottery method (Figure 1). Study participants comprised of children aged six years and below with refractive errors who were prescribed spectacle correction. Those parents who refused participation were excluded.

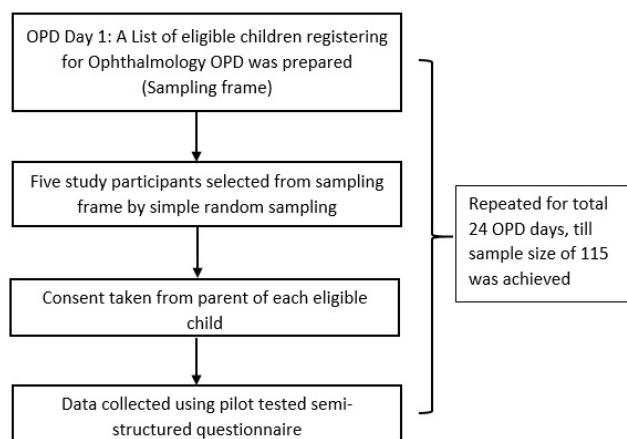


Fig. 1: Flowchart depicting selection of study participants

Sample size of 105 was calculated using the formula $n = [(z^2 \times p \times q) + d^2] \div d^2$ where $z = 1.96$ (constant for 95% confidence level), $p = 0.074$ (proportion of spectacle wear non-compliance)⁴ $q = (1 - p) = 0.926$ and $d = 0.05$ (precision)

Anticipating a dropout rate of ten percent, an effective sample size of 115 was obtained.

2.1. Data collection

A semi-structured questionnaire was developed based on previous studies and was used to collect data.^{4,5}

Questionnaire was pilot tested on a sample of participants to check for comprehensibility and based on the feedback obtained, questionnaire was revised accordingly. After obtaining consent from the parent of the child, data was collected by interviewing the parent of the child. Confidentiality and anonymity of participants was maintained, participation was voluntary and there were no monetary benefits.

Spectacle wear non-compliance was considered as child wearing spectacle for less than six hours per day as obtained from the history given by participant. Demographic details such as age, sex, place of residence and mother's education were included. Other variables under study were astigmatism, anisometropia, myopia, hypermetropia, squint, intolerance to glasses, glasses lost, glasses broken, concerned teasing and cost issues.

2.2. Statistical analysis

The data obtained was entered in Microsoft Excel 2016 and analysed using Epi Info android mobile app version 1.4.3 and IBM Statistical Package of the Social Science (SPSS) Statistics version 14. Categorical variables were expressed as frequencies and percentages. Fisher's exact test was used to determine association between categorical variables. In univariate analysis, each variable was tested against the dependent variable (spectacle wear non-compliance) and crude odds ratio (OR), respective 95% confidence interval (95%CI) and P values were estimated. All variables with a $P < 0.5$ were selected for multivariate logistic regression. Adjusted Odds Ratio (AOR), respective (95%CI) and P values were estimated. The statistical level of significance was set at $P \leq 0.05$.

3. Results

Out of 115 children, 58 (49.6%) were males and 57 (49.4%) were females. Majority (i.e. 64.3%) of the children were residing in urban area and mothers of most (i.e. 64.3%) of them had schooling of higher than primary (Table 1).

Factors associated with spectacle wear non-compliance.

The proportion of spectacle wear non-compliance was 53.04%. Most common reasons given for non-compliance to spectacle wear in study participants was intolerance to glasses (42.6%) (Table 2). Statistically significant association was observed between spectacle wear non-compliance and other independent variables such as age of the child ($P = 0.002$), mother's education ($P = 0.01$), anisometropia ($P < 0.001$), astigmatism ($P = 0.03$), manifest squint ($P = 0.025$), Intolerance to glasses ($P < 0.001$), Glasses Lost ($P = 0.001$), Glasses Broken ($P < 0.001$), Concerned teasing ($P < 0.001$) and Cost issues ($P < 0.001$) (Table 3).

There was no statistically significant association between spectacle wear non-compliance and other variables such

Table 1: Demographic characteristic of study participants

Variables	Frequency (n=115)	Percentage (%)
Age		
< 2	30	26.1
2 - 4	46	40.0
4 - 6	39	33.9
Sex		
Males	58	49.6
Females	57	49.4
Mothers education		
Illiterate	8	7.0
Up to primary	33	28.7
Higher than primary	74	64.3
Residency type		
Rural	41	35.7
Urban	74	64.3

Table 2: Reasons for non-compliance to spectacle wear in study participants

Reasons	Frequency (n=115)	Percentage (%)
Intolerance to glasses		
Yes	49	42.6
No	66	57.4
Glasses Lost		
Yes	14	12.2
No	101	87.8
Glasses Broke		
Yes	35	30.4
No	80	69.6
Concerned teasing		
Yes	24	20.9
No	91	79.1
Cost issues		
Yes	42	36.5
No	73	63.5

as sex of the child, place of residence, hypermetropia and myopia.

Independent factors associated with spectacle wear non-compliance (Multivariate Logistic Regression).

In the multivariate analysis (Table 4), it was found that children with spectacle wear non-compliance were more likely to belong to the age group of two to four years (AOR = 4.3; 95% CI: 1.3-14.3), less than two years (AOR = 8.9; 95% CI: 2.1-36.8) as compared to four to six years of age. Likelihood of spectacle wear non-compliance was also found in following situations: mothers with up-to primary school education (AOR = 3.7; 95% CI: 1.2-11.7) compared to those having higher than primary school education; in children without manifest squint (AOR = 3.8; 95% CI: 1.3-11.3) as compared to those with manifest squint; in children with anisometropia (AOR = 11.1; 95% CI: 3.4-36.7) as compared to those who did not have anisometropia. The above finding were statistically significant at $P \leq 0.05$.

4. Discussion

In our study, we observed that, more than half (53.04%) of the children were not compliant to spectacle wear, which was similar to the non-compliance observed by Bruce et al.⁶ (53.0%), whereas a lower non-compliance of 46.1% was observed among five to seven years old children in Aligarh, Uttar Pradesh.⁵

Odds of being non-compliant to spectacle wear was more if mothers had attended school up to primary as compared to those whose mothers had higher than primary school education. Similar results were observed by Bhandari et al.² where children of parents with lower educational qualification were more non-compliant to spectacle wear than children born to parents with a higher educational status. These findings can be attributed to lack of awareness in less educated parents, about consequences of uncorrected refractive errors.

Table 3: Factors associated with non-compliance to spectacle wear in study participants

Variables	Category	Non-compliant(n=61) No. (%)	Compliant(n=54) No. (%)	P value †
Age (years)	< 2	23 (37.7%)	7 (13.0%)	0.002*‡(χ ² = 12.84)
	2 - 4	25 (41.0%)	21 (38.9%)	
	4 - 6	13 (21.3%)	26 (48.1%)	
Sex	Males	31 (50.8%)	27 (50.0%)	1.000
	Females	30 (49.2%)	27 (50.0%)	
	Illiterate	7 (11.5%)	1 (1.9%)	
Mothers education	Up to primary	22 (36.0%)	11 (20.4%)	0.010*‡(χ ² = 9.13)
	Higher than primary	32 (52.5%)	42 (77.7%)	
Residency type	Rural	25 (41.0%)	16 (29.6%)	0.240
	Urban	36 (59.0%)	38 (70.4%)	
Anisometropia	Present	31 (50.8%)	9 (16.7%)	<0.001*
	Absent	30 (49.2%)	45 (83.3%)	
Astigmatism	Present	36 (59.0%)	20 (37.0%)	0.020*
	Absent	25 (41.0%)	34 (63.0%)	
Hypermetropia	Present	26 (42.6%)	27 (50.0%)	0.460
	Absent	35 (57.4%)	27 (50.0%)	
Myopia	Present	27 (44.3%)	22 (40.7%)	0.710
	Absent	34 (55.7%)	32 (59.3%)	
Manifest squint	Present	16 (26.2%)	26 (48.1%)	0.020*
	Absent	45 (73.8%)	28 (51.9%)	
Intolerance to glasses	Yes	49 (80.3%)	0 (0.0%)	<0.001*
	No	12 (19.7%)	54 (100.0%)	
Glasses Lost	Yes	14 (23.0%)	0 (0.0%)	<0.001*
	No	47 (77.0%)	54 (100.0%)	
Glasses Broke	Yes	35 (57.4%)	0 (0.0%)	<0.001*
	No	26 (42.6%)	54 (100.0%)	
Concerned teasing	Yes	24 (39.3%)	0 (0.0%)	<0.001*
	No	37 (60.7%)	54 (100.0%)	
Cost issues	Yes	42 (68.9%)	0 (0.0%)	<0.001*
	No	19 (31.1%)	54 (100.0%)	

* Statistically significant, †Fisher Exact Test, ‡Pearson Chi-square with Yates correction

We also observed that, younger children (less than four years of age) were more likely to be non-compliant to spectacle wear than older children (four to six years of age). Similar findings were observed in Aligarh, Uttar Pradesh.⁵ On contrary, a study done in Rohtak, Haryana, observed that older children were more non-compliant to spectacle wear than younger children.⁷

Children with anisometropia were more likely to be non-compliant to spectacle wear as compared to children without anisometropia. This can be due to ineffective correction of anisometropia, leading to double vision and hence non-compliance to spectacle wear. Similarly, odds of being non-compliant to spectacle wear was more in children without manifest squint as compared to the children with manifest squint.

Statistically significant association was observed between spectacle wear non-compliance and other variables such as astigmatism, Intolerance to glasses, Glasses Lost, Glasses Broken, Concerned teasing and Cost issues. Mehnaz et al.⁵ observed statistically significant association between spectacle wear non-compliance and concerned

teasing.

We did not find any statistically significant association between sex of child and non-compliant to spectacle wear, whereas Bhandari et al.² observed that boys were more non-compliant to spectacle wear than girls.

Holguin et al.⁸ found that odds of spectacle wear non-compliance were significantly higher among urban children as compared to rural children. However, we did not observe any statistically significant association between spectacle wear non-compliance and type of residency.

We did not observe any statistically significant association between spectacle wear non-compliance and other variables such as hypermetropia and myopia. Whereas statistically significant association was observed between spectacle wear compliance and hypermetropia and myopia by Von-Bischhoffshausen et al.⁹

Most common reason for spectacle wear non-compliance was intolerance to glasses followed by high cost of spectacle. Whereas the most common reasons observed by Messer et al.¹⁰ for not wearing spectacle was lost spectacles (44.9%) and broken spectacles (35.3%). Similar

Table 4: Multivariate analysis of factors associated with non-compliance to spectacle wear in study participants

Variables	Unadjusted OR † (95% CI) ‡	P value	Adjusted OR (95% CI)	P value
Age of child (years)				
< 2	6.57 (2.24 - 19.29)	< 0.001*	8.86 (2.13-36.80)	0.003*
2 - 4	2.97 (0.98 - 5.76)	0.085	4.26 (1.27-14.28)	0.019*
4 - 6	1 (Reference)	-	-	-
Mothers education				
Illiterate	9.19 (1.08 - 78.50)	0.045*	9.76 (0.87-110.12)	0.065
Up to primary	3.50 (0.38 - 32.12)	0.470	3.69 (1.17-11.66)	0.026*
Higher than primary	1 (Reference)	-	-	-
Residency type				
Rural	1.65 (0.76-3.58)	0.280	1.29 (0.48-3.50)	0.620
Urban	1 (Reference)	-	-	-
Anisometropia				
Present	5.17 (2.16 - 12.38)	<0.001*	11.11 (3.36-36.73)	<0.001*
Absent	1 (Reference)	-	-	-
Astigmatism				
Present	2.45 (1.15-5.19)	0.030*	2.23 (0.82-6.09)	0.120
Absent	1 (Reference)	-	-	-
Manifest squint				
Absent	2.61 (1.20 - 5.70)	0.025*	3.83 (1.30-11.27)	0.015*
Present	1 (Reference)	-	-	-

* Statistically significant, †OR – Odds Ratio, ‡95%CI – 95% Confidence Interval

observations were observed by Gogate et al.⁴

5. Conclusion

Children with spectacle wear non-compliance were more likely to: belong to the age group of two to four years (AOR = 4.3; 95% CI: 1.3-14.3); have mother with up-to primary school education (AOR = 3.7; 95%CI: 1.2-11.7); have anisometropia (AOR = 11.1; 95% CI: 3.4-36.7) and those without manifest squint (AOR = 3.8; 95%CI: 1.3-11.3).

6. Recommendations

Children of illiterate mothers or those with up-to primary school education should be given special attention and their parents should be informed about the possible consequences that may occur due to spectacle wear non-compliance. This is only possible if parent's educational status is included in history taking at OPD level.

Multi-specialty approach (involving ophthalmologist, paediatrician and optician) can be used to tackle spectacle wear non-compliance in children aged four years and below.

7. Limitations

A Focus Group Discussion should have been conducted among parents of children aged six years and below in order to understand their perceptions, attitudes, beliefs, opinions and ideas on spectacle wear in children.

Father's educational history should have been assessed to find out its association with non-compliance to spectacle

wear.

8. Source of Funding

None.

9. Conflict of Interest

None.

References

- Sharma P, Gaur N. How do we tackle a child's spectacle? *Indian J Ophthalmol.* 2018;5:651–2.
- Bhandari G, Pradhan S, Shrestha M, Bassett K. Eye glasses compliance among children undergoing school visual acuity screening in Nepal. *Adv Ophthalmol Vis Syst.* 2016;5:286–90.
- Sushil O, Meenu B, Vaibhav J, Brijesh S, and SS. Pattern of refractive error in paediatric patients coming to rural tertiary care hospital of Central India. *Indian J Clin and Exp Ophthalmol.* 2016;2:72–5.
- Gogate P, Mukhopadhyaya D, Mahadik A, Naduvilath TJ, Sane S, Shinde A. Spectacle compliance amongst rural secondary school children in Pune district, India. *Indian J Ophthalmol.* 2013;61:8–12.
- Mehnaz S, Siddiqui Z, Abedi AJ, Ansari MA. Spectacle wear and factors associated with non-compliance among children of 5-15 years. *Indian J Comm Health.* 2020;32:87–90.
- Bruce A, Kelly B, Chambers B, Barrett BT, Bloj M, Bradbury J, et al. The effect of adherence to spectacle wear on early developing literacy: a longitudinal study based in a large multiethnic city. *BMJ Open.* 2018;8:e021277. doi:10.1136/bmjopen-2017-021277.
- Bhatt NK, Rathi M, Dhull CS, Sachdeva S, Phogat J. Spectacle compliance amongst school children of Rohtak. *Int J Community Med Public Health.* 2017;4:734–7.
- Holguin A, Congdon N, Patel N, Ratcliffe A, Estes P, Flores ST. Factors Associated with Spectacle-Wear Compliance in School-Aged Mexican Children Invest Ophthalmol Vis Sci. 2006;47:925–953.
- Von-Bischoffshausen FB, Muñoz B, Riquelme A, Ormeño MJ, Silva JC. Spectacle-Wear Compliance in School Children in Concepción

Chile. *Ophthalmol Epidemiol.* 2014;21:362–9.

10. Messer DH, Mitchell GL, Twelker JD, Crescioni M. Spectacle Wear in Children Given Spectacles Through a School-Based Program. *Optom Vis Sci.* 2012;89:19–26.

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