

Compliance of spectacle wear and its determinants among schoolchildren of Dhakhiliya region of Oman: A descriptive study

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مدى الالتزام بارتداء النظارات الطبية و محدّداته بين طلبة المدارس بالمنطقة الداخلية بسلطنة عمان - دراسة وصفية

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المستخلص: الهدف: تهدف الدراسة إلى تحديد مدى الالتزام بارتداء النظارة الطبية و بعض محدّداته بين طلبة المدارس في المنطقة الداخلية في سلطنة عمان. **الطريقة:** هذه دراسة مقطعية وصفية، اشتملت على عينة من 663 طالب ممن تم وصف نظارة طبية لهم مع التأكيد عليهم بارتدائها باستمرار. وبعد عام واحد، قام فريق صحي من ذوي الخبرة بمتابعة هؤلاء الطلبة حيث تم فحص 571 طالباً و جمع بيانات حول أعمارهم، جنسهم، نوع و درجة عيوب الإنكسار البصري لدى المصابين . و ذلك من خلال سجلات الصحة المدرسية لهؤلاء الطلبة و تقارير فني البصر بالمنطقة. تم تحليل البيانات للتعرف على مدى ارتباط هذه العوامل بالالتزام بارتداء النظارة الطبية. **النتائج:** كان غالبية الطلبة (71,6%) يرتدون النظارة وقت المتابعة. و قد بلغ معدل الالتزام بارتداء النظارة بين الذكور (65,1%) و الإناث (78,3%). أما بالنسبة لأعمارهم ، فقد كان 66,7% في سن 6-7 سنوات ، 66,7% في سن 12-13 سنة و 79,1% في سن 16-17 سنة. وقد بلغ المعدل 72,5% بين الطلبة الذين يعانون من قصر النظر ، 67,9% بين الطلبة الذين يعانون من طول النظر. كما زاد الالتزام بارتداء النظارة الطبية بين الطلبة الذين يعانون من ضعف النظر 2,5 D أو أكثر عنه و بين الطلبة الذين يعانون من قصر النظر أقل من 2,5 D . ولا توجد دلالة إحصائية تقارن معدل الالتزام بين الطلبة الذين يعانون من طول النظر بدرجات مختلفة. **الخلاصة:** حددت الدراسة عوامل الخطورة للفئات التي تؤدي لعدم الالتزام بارتداء النظارة الطبية وهي الذكور، صغار السن، درجات منخفضة من عيوب الإنكسار المرتبطة بقصر النظر. يجب على برنامج صحة العين بسلطنة عمان الاهتمام مستقبلاً بهذه الفئات لرفع التزام التلاميذ بارتداء النظارات الطبية.

ABSTRACT. Objective: To determine the degree of compliance of spectacle wear and some of its determinants among school children of Dhakhiliya region of Oman. **Methods:** This was a cross-sectional descriptive study of a sample of 663 students who had been prescribed spectacles for constant wear. After one year, experienced field staff conducted a follow-up visit where 571 of these students were examined. Information on age, gender, type and severity of refractive error was collected from the school health records and refractionist's report and analyzed to associate them to the compliance of spectacle wear. **Results:** The majority (71.6%) of students were using spectacles at the time of follow up. The compliance rate was 65.1% in boys and 78.3% in girls. Agewise, it was 66.7% in 6-7-year-olds, 66.7% in 12-13-year-olds and 79.1% in 16-17-year olds. The rate was 72.5% among students with myopia and 67.9% among those with hypermetropia. The compliance of spectacle wear was significantly higher among students with myopic refractive error of 2.5 D or more compared to those with less than 2.5 D. The difference in the compliance rates among students with hypermetropia of different grades was not significant. **Conclusions:** The study identifies the factors of high-risk of non compliance as (a) male gender, (b) younger age, and (c) low myopic refractory error. The eye health care program of Oman should focus on these high risk groups to further improve the compliance for visual aids.

Key words: Compliance, spectacle wear, schoolchildren, Oman

THE WORLD HEALTH ORGANISATION RECOMMENDS monitoring the outcome of refractive services, using appropriate indicators for it and conducting operational research on the issue to achieve the goal of eliminating avoidable visual disability due to refractive error.¹ Sultanate of Oman, one of the member countries of WHO, has about 40% of its population aged 6-18 years.² Refractive error in this age affects development of the children. Hence, health initiatives for school children in Oman include detection and management of this easily rectifiable problem.

The eye health care program in Oman provides refractive services to the students of first primary, first preparatory and first secondary grades on annual basis since 1993.³ The students of these three grades are 6-7, 12-13 and 16-17 years old respectively. The refractionists visit schools once a year. and follow the guidelines for prescribing spectacles as recommended by WHO and adopted in Oman. Students with defective vision detected during screening are subjected to retinoscopy and subjective refraction testing using trial lenses. In case of students having hypermetropia, the refraction

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is performed under cycloplagia at an eye clinic. A child with myopia of more than -0.5 Dioptre (D) or hypermetropia of more than $+1$ D are prescribed spectacles. All students with myopia of more than -5.0 D are also referred to ophthalmologist for retinal evaluation. A child with strabismus or amblyopia is also referred to ophthalmologist for further care.

The Dhakhiliya region of Oman had 6,831 students in the first primary grade, 7,496 students in first preparatory grade and 5,492 students in first secondary grade with the prevalence of refractive error of 0.8%, 4.4% and 10.3% respectively during the academic year 2000–01. The rate of myopia was 0.3%, 3.7% and 8.7% respectively. The rate of hypermetropia was 0.4% at all three levels.

Although comprehensive eye care for children with refractive error is practised in Oman, only limited information is available on the magnitude of the compliance for spectacle wear and their determinants. This information is crucial for the program to strengthen its efforts for eye care of children with refractive error. Therefore, the eye health care programme established the system of follow up of students with refractive error to evaluate their compliance of spectacle wear. The school health nurse ensures that students who have been advised spectacles are counselled, and those referred to ophthalmologists are sent by the school transport.

This study was carried out between January and April 2001. It aimed to review the rate of the spectacle wear one year after advice to the school children of Dhakhiliya region and identify the determinants of the non-compliance to visual aids. Based on the outcomes, strategies to improve the compliance could be recommended.

METHOD

This was a cross sectional descriptive study. The school students of Dhakhiliya region who were prescribed the spectacles during school year 1999-2000 were the study population. A refractionist and the regional eye health-care supervisor were the field investigators. They visited the schools and examined the students with refractive error. To minimise dropout, the school health staff was informed in advance regarding the dates and purpose of the follow up visit. Revisit to cover absentees was not possible due to logistic problems. The students' identity, age, gender, school level, type and severity of refractive error were noted. On the basis of reported age at three levels of school, the sample was divided into age groups of 6–7, 12–13 and 16–17 years. The field staff listed all students who had been advised spectacles and noted whether each student was wearing spectacles in the class

or not. If a student had spectacles but was not wearing it, the student was considered as "not using visual aid". The criteria of compliance used in this study were decided for its feasibility and as per the protocol of follow up.²

The data was computed and analysed using Microsoft Excel 2000. Frequencies of students using spectacles and crude percentage proportions were calculated. Univariate statistical model was used in this study. For each sub unit of school level, gender and *wilayat* (district), the number of compliant students were projected to the study population and adjusted rates were calculated for different variants by using direct standardisation method. The proportion of both male and female population in different regions that were documented in the demographic projections for the mid 2000² were taken as reference for direct method of standardisation. For the statistical validation, 95% CIs were calculated. The width of the CI and the overlapping of the values, χ^2 and p values were noted to determine the statistical significance.

Verbal consent of the school authorities was obtained on behalf of minor children, to undertake this non-invasive operational research. (In Oman, school authorities can give consent on behalf of parents for including a child into a non-invasive operational research undertaken by health and school authorities.) Permission to undertake this study was obtained from the Ministry of Health, both at regional and national levels. The students not wearing spectacles at the time of survey were again counselled and the school authorities were requested to discuss the issue with the parents so that the spectacles could be procured and used by the students. The study noted the compliance rate on the basis of one visit to school. The compliance of spectacle wear in relation to time can be assessed through frequent observation, which was not done in the present study. Therefore, the reported compliance rate does not give picture of constant use of spectacles.

RESULTS

PARTICIPATION RATE

Six hundred and sixty three students who had been prescribed spectacles were the enumerated sample of the study. Of them, 571 were examined. The participation rate was 86.1%. The remaining 92 students (51 boys and 41 girls) (Seven 6–7 year-old, forty five 12–13 year-old and forty 16–17-year-old) were absent on follow up visit or their family had migrated elsewhere. No student refused to participate.

Table 1. Profile of the study sample by gender and age

Age group (years)	Boys		Girls	
	Enumerated	Examined (%)	Enumerated	Examined
6–7	15	13(86.7%)	21	16 (76.2%)
12–13	100	74(74.0%)	153	134 (87.6%)
16–17	160	137(85.6%)	214	197 (92.1%)
Total	275	224(81.5%)	388	347 (89.4%)

REPRESENTATIVENESS

The profile of study sample by age group and gender is given in Table 1. The participation rate was lower in 6–7-year-old boys than girls. In other two age groups, boys had lower rates of participation than girls. Direct age-sex standardisation of the compliance rates was carried out.

COMPLIANCE RATE OF WEARING SPECTACLES

The frequency, crude and adjusted rates of the compliance for spectacle wear along with 95% Confidence

Interval (CI) are given in Table 2. More than two thirds of the students who had been advised spectacles seemed to be using them after one year. Girls had significantly higher compliance rates than boys. Secondary students showed significantly higher compliance than preparatory students.

COMPLIANCE BY TYPE AND SEVERITY OF REFRACTIVE ERROR

The frequency, crude and adjusted rates of the compliance for spectacle wear among myopics both of mild (<2.5 D) and severe ($\geq 2.5D$) grades and hypermetropics both of mild (<1D) and severe ($\geq 1D$) grades are given in Table 3. For comparison, χ^2 and P values are also given. The compliance rate significantly differed by severity of myopia.

DISCUSSION

Evaluation of the impact of the ongoing refractive activities as recommended by WHO¹ would not only help the program to determine the magnitude of the compliance of spectacle wear but also understand its determinants like age, gender, type and severity of refractive error. Based on the outcome of this study, to strengthen the uptake of spectacle wear among students, recommendations could improve eye care of children with refractive error.

The study had more than 85% coverage. The non

Table 2. Compliance rates of spectacle-wear

Sub-group (examined sample)	Number of students wearing spectacles	Compliance rate (%)		Confidence Interval (CI)	95% CI	P
		Crude	Adjusted			
Male (n=224)	146	65.2	64.1	57.82	70.38	0.2072
Female (n=388)	272	78.4	78.1	73.98	82.22	
1st Primary (n=29)	19	65.5	65.5	48.20	82.80	
1st preparatory (n=208)	134	64.4	64.4	57.89	70.91	0.0004
1st Secondary (n=334)	265	79.3	79.3	74.95	83.65	
Myopia (n=540)	397	73.5	72.5	68.73	76.27	0.4801
Hypermetropia (n=31)	21	67.7	67.9	51.47	84.33	
Total (n=571)	418	73.2	72.3	68.63	75.97	

Table 3. Compliance of spectacle wear by severity and type of refractive error

Sub-group (examined sample)	Number of students wearing spectacles	Compliance rate (%)		Confidence Interval (CI)	95% CI	P
		Crude	Adjusted			
Myopia of <2.5 D spectacles (n= 417)	292	70.0	68.9	64.8	73.1	0.0007
Myopia of ≥2.5 D spectacles (n= 123)	105	85.4	85.1	81.7	88.5	
Hypermetropia of < +1 d (n=8)	6	75.0	74.1	45.4	99.9	0.6905
Hypermetropia of ≥ +1 d (n=23)	15	65.2	64.0	47.1	80.9	

participation was at random. With low rate of non participation and lack of evidence of systematic differential loss in the present study, the results are likely to be representative of the students with refractive error in Dhakhiliya region during the study period. If all absentees are considered to be non-compliant, the rate of compliance could be considered as underestimation by 14%. This, however, is unlikely.

The representation of different subgroups in the enumerated and examined sample differed. Adjustments of the rates by gender and age group minimised the influence of these and other unknown confounders.

Involvement of only one team of field investigators minimised the inter-observer variation. The use of qualified personnel speaking the local language and working in the field since ten years minimised measurement error and also ensured cooperation of the students and school staff. The refractionist was a graduate optician. The sanitary inspector held a diploma in public health. Both had fifteen years of field experience of eye care and conducting operational research. Thus, the learning curve of the field staff is less likely to affect the study results. The use of school health booklets for information on students' previous records, and the well-defined observation methodology reduced the chances of information bias in the study. Standard data collection method and instrument, and matching it with the computer format prior to the study, minimised the loss of data and in data entry.

The measurement criteria for the compliance of spectacle wear was stringent in this study. The assessment of dropouts of medical care attending a health institution is also evaluated strictly using the parameter of those attended on the day or not. Similar measures were used in this study to determine the compliance of the spectacle wear. The compliance rate was above 70% among

students with refractive error. In a UK study, the compliance to first-time spectacle wear by children aged less than eight years was 79.5%.⁴ Another study in UK found that only two-thirds of 10-year-old children were using spectacles on follow up.⁶ A study in Fiji had compliance rate of full-time spectacle wear of only 28% and occasional use of 35%.⁵ Thus the compliance rate for using visual aids in the present study matched those observed in other studies except the one in Fiji.

Poor compliance of spectacle wear was more prevalent among boys than among girls. This is paradoxical, since girls, who are cosmetically more conscious, would be expected to avoid wearing spectacles. Their head scarves that cover the ears should further discourage spectacle wear. As such, the higher compliance in girls is needs further investigation.

Poor compliance was more in younger children. The ability of older children to better understand the desirability of compliance, and the more precise visual needs for higher studies, could be the reasons. The attitude of the parents to delay or ignore advice for spectacles for their younger children might also cause differential compliance rate by age group.

Students in preparatory and secondary classes are provided health education by the health staff at the time of prescribing spectacles. They are also guided to procure their spectacles at subsidised rate from specified optical shops of the area. For primary school children, the health staff forwards prescriptions to the school authorities, who forward them to the parents. The different modes for younger and older children might have resulted in high compliance in secondary students compared to younger ones. For the younger children who do not procure their spectacles within reasonable time, parent-teacher meetings should be organised to discuss the

issue of procurement and use of spectacles.

Due to small sample of primary school children with refractive error in the present study, the determinants of compliance with statistical significance in the younger age group could not be deduced. However, the study in UK revealed that fit of the spectacles and peer pressure/response were the main factors affecting the compliance of spectacles wear in young children.⁴

Myopia was more prevalent in the study group than other conditions. The compliance of spectacle wear was only marginally higher in students with myopia than those with hypermetropia, and the element of chance in this observation cannot be ruled out. Comparison between these two groups is further detracted due to the much smaller sample size of students with hypermetropia. Compliance rate was significantly higher among students afflicted with myopia of higher refractive error compared to those with lower error. Age and gender could be confounders, but by direct age sex standardisation, their effect was minimised.

Since this condition is asymptomatic in many cases, students with myopia of less than 2.5 D could continue their daily activities with less difficulty. The students with severe grade of myopia might be more likely to be wearing spectacles, as it could affect their studies.

CONCLUSION

The compliance of spectacle wear was high among students of Dhakhiliya region. In spite of being advised and prescribed spectacles, male, younger students and those with myopia of less than 2.5D seem to be at higher risk of not using spectacles after one year. The programme aiming at reducing eye strain due to refractive error

should further focus on these groups. The determinants for compliance of visual aid found in this study could be compared with other regions of Oman and then policies for improving the refractive services could be revised accordingly.

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REFERENCES

1. **World Health Organization.** Elimination of avoidable visual disability due to refractive errors Report on informal planning Meeting WHO/PBL/00.79 pp2, 2000, 4, 46.
2. **Ministry of Health.** *Sultanate of Oman Annual Health Report for year 2000.* 2001.
3. **Ministry of Health.** *Sultanate of Oman Eye Health Care Manual* 2nd edition, 2000.
4. **Horwood AM.** Compliance with first time spectacle wear in children under eight years of age. *Eye*, 1998, 2, 173–178.
5. **Johnson B, Yolton RL** Effectiveness of optometric aid to Fiji, South Pacific. *J Am Optom Assoc*, 1986, 57, 436–439.
6. **Stewart-Brown S.** Spectacles prescribing among 10 year old children *Br J Ophthalmol*, 1985, 69, 874–880.
7. **Vitale S, Schein OD, Meinert CL, et al.** Refractive status and vision profile: a questionnaire to measure vision related quality of life in persons with refractive error. *Ophthalmology*, 2000, 107, 1529–1530.