Research Article

Frequency of Ocular Morbidities among Children and Adolescents in Conventional and Religious School (Madaris) of Karachi, Pakistan

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Abstract

Background: Refractive errors remain a major cause of vision impairment in children globally. These optical imperfections in the eye prevent light from focusing on a single point on the retina, leading to reduced vision.

Objectives: To determine the frequency of refractive error and most common eye complaints among children aged 3 to 15 years of schools and madaris in Karachi.

Methods: A cross-sectional study was carried out during 2019. Two schools and two madaris were selected based on convenience and 1500 children were included in the study. Interviews and physical examinations were used to investigate ocular disorders. The visual acuity was determined using Snellen's visual acuity measurement chart. For data analysis, SPSS version 24 was used. The frequency of various eye problems was determined. Chi square test was used to investigate association between refractive error and of children institution. P-value < 0.05 was considered statistically significant.

Results: Out of 1500 children included, 665 from school and 835 from madaris. Refractive errors were found in 15.8% of school children and 30.4% of madaris children. Night blindness was reported in 3.6% of schools and 9.3% of madaris children. The squint was found in 0.2% school children and 1.4 % of madaris children. Colour blindness was found in 5.9% school children and 0.4 % in madaris children.

Conclusion: When compared to school, madaris children had a higher prevalence of refractive errors. Children attending madrassas who spent more time studying, watching television or using computers, and had parents or sibling who wore glasses, experienced higher rates of ocular morbidities. Screening of school-age children is critical because early detection and correction of refractive errors will delay/slow the progression.

Keywords | School children, Refractive error, eye problems, myopia

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Introduction

Refractive errors continue to be one of the leading causes of vision impairment in children worldwide.[1] It is an optical imperfection inheriting the eye that prevents light from being focused on a single spot on the retina, hence reducing vision.[2] If refractive errors go unchecked, they have serious societal and economic consequences.[3] Because of its sensory perception, cognition and educational successes, it has a detrimental impact on academic achievement.[4]

Globally, more than 2.3 billion people have poor vision due to refractive errors.[5] According to the World Health Organization (WHO), approximately 19 million children and adole-scents aged 5 to 15 years have visual impairment, with uncorrected refractive error accounting for approximately 12.8 million (67%).[6] In all researches, myopia is the most commonly reported refractive error. It has a diverse aetiology, with both environmental and genetic factors thought to be involved in the development and progression

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of myopia. Near work, dim light exposure, a lack of physical activity, and urbani-zation are all environmental factors that contribute to deve-lopment and progression of myopia.[7] Because of the global variation, the prevalence of myopia has varied geographically. East Asia has the highest prevalence (up to 73%), North America has the highest rates (42%) and African and South American children have the lowest prevalence (under 10%).[8] Even within the same region, it is higher in urban areas than in rural areas.

Myopia usually appears in early childhood.[9] Children rarely complain of poor vision and may be unaware of the problem. They compensate for poor vision by changing their position in the classroom, moving objects closer, and avoiding tasks that require more visual concentration.[10]

In Pakistan, there are two educational systems; the traditional religion-based education system and the modern formal education system.

The traditional religious-based system also known as madaris are attached to the mosques, and it is where children are initiated in religious education with an emphasis on reading the Holy Quran (nazira), memorization of the verses in the Holy Quran (hafiz) and techniques for reciting the Holy Quran (tajweed). It has been observed that students in formal schools have separate class rooms and that teaching is done on black boards. Madaris students, on the other hand, study in a single overcrowded room. There is no black board system and the students keep their books on a small wood/ plastic/ iron tables that are very close to the eyes and recite the books for a long period of time. Prolonged reading in an overcrowded environment puts these students at a risk of developing and progressing myopia.[11] Researchers discovered a high prevalence of refractive errors in madaris students, with 52.6% in Haripur (KPK Province) and 42% to 65% in Lahore Punjab.[12,13] During 2008, 51 % madaris students in Karachi had refractive errors compared to only 17 % in formal schools.[14,15]

Three million students are enrolled in 35000 madaris that have been registered with the Directorate General of Religious Education, Ministry of Federal Education and Professional Training Pakistan. Sindh province has 758 registered madaris, 84 of which are in Karachi.[16] There have been very few studies comparing refractive errors in formal and madaris school children. The study aimed determine the frequency of refractive error and most common eye complaints among children aged 3 to 15 years of schools and madaris in Karachi. The goal was to identify and address these issues early, preventing poor academic performance and reducing the risk of school dropouts. Additionally, early detection of refractive errors would allow for timely and proper treatment, helping to prevent long-term complications.

Methods

A cross-sectional study was undertaken at Karachi where two schools and two madaris were conveniently selected from January till September 2019. The survey covered all students aged 5 to 15 years from selected schools and madaris. The administration obtained written authorization from students' parents/guardians. Students who were ill or on medicine for any ailment (as some drugs have ocular side effects) were barred from participating. The data collection team was trained by an eye consultant from the Medical College. A pilot study was carried out to validate the data collection forms in order to reduce inter-observer differences. All students from schools/madrassas who met the inclusion criteria were interviewed in depth regarding any current or past eye problems. A history of refractive error/ optical use in siblings/parents was also acquired. Snellen's Illiterate 'E' chart was used to test the student's distant vision and visual acuity at 6 metres. The Ishihara Colour Vision test found colour blindness. The examination was conducted in a separate room in the presence of a teacher. Children who were found to have refractive problems were taken to an Eye Specialist at Hamdard University Hospital. Children with uncorrected refractive error were given low-cost spectacles. Both type of school administration were given recommendations for regular follow-up with our eye consultant. Medical College research committee gave the ethical approval and the administration of both institutions granted permission. (HCMD/CHS/189/2019). Before asking about the eye problems, a briefing about the various parts and objective of the study was given. The subjects' identities remained anonymous and confidentiality was assured and that the information gathered will only be used for research purposes. Subjects not giving consent were not invited to participate in the study.

SPSS version 24.0 was used for statistical analysis. Descriptive analysis was carried out for all independent variables. The frequency of various eye ailments was determined and Chi-square test was used to examine the association between ocular morbidities and school/madrassas. P-value less than 0.05 was considered statistically significant.

Results

A total of 1500 students were interviewed and evaluated to ensure that they met the inclusion and exclusion criteria. A total of 665 (44.3%) students were from schools while 835 (55.7%) students were taken from madaris. The mean age of participants was 11.72 ± 2.38 years. The majority of school students 347 (52.2%) spent 3 to 6 hours studying and 521 (78.3%) spent one hour watching television/computers. On the other hand, 714 (85.5%) of madrassa students spent more than 6 hours each day studying whereas 717 (85.9%) spent one hour per day viewing television/computers. There were 261 (17.4%) parents/sibling of students who wore

spectacles. Statistically significant (P < 0.05) association were found between study hours, time spent watching TV/ computers and parents/siblings wearing spectacles with school and madrassa (Table 1).

The visual acuity of the right eye was normal (6/6) among 556 (83.6%) school students and 583 (69.8%) madrassa students, but 109 (16.4%) of school students and 252 (30.2%) madrassa students were myopic. Colour blindness in the right eye was found in 39 (5.9%) of school students and 3 (0.4%) of madrassa students. The visual acuity of the left eye was normal (6/6) in 565 (85%) school students and 578 (69.2%) of madrassa students, while 100 (15%) of school students and 257 (30.8%) of madrassa students were myopic. The colour blindness in the left eye was found in 39 (5.9%) of school students and 3 (0.4%) of madrassa students. There is statistically significant association (P < 0.05) between visual acuity and colour blindness and school and madrassa (Table 2).

In terms of eye complaints among school and madrassa students, 342 (22.8%) had difficulty focusing on a board and 278 (18.5%) had difficulty reading books. Complaints con-cerning blurred vision were reported by 289 (19.3%), head-ache 591 (39.4%), excessive eye blinking 249 (16.6%), redness 314 (20.9%), pain in eye 119 (7.9%), discharge from eyes 417 (27.8%), burning sensation 242 (16.1%), foreign body sensation 127 (8.5%) and night blindness 102 (6.8%). There is statistically significant association between concen-trating board and reading books, blurred vision, headache, frequent eye blinking, redness, pain, foreign body sensation, and night blindness with school and madrassa (Table 3).

Discussion

In the present study, 34% of madaris students had myopia,

Table 3: *Comparison of Time spent in study watching TV, computer use and parents/siblings wearing Spectacles with schools and Madrissas Children*

Variable	School n=665(%)	Madrasa n=835 (%)	Total n=1500(%)	P-value
Age in years	**Mean ± SD (Range), 11.72 ± 2.38 (3-19)**			
≤ 10	234 (35.2)	253 (30.3)	487 (32.5)	.025
> 10	431 (64.8)	582 (69.7)	1013 (67.5)	
Time spent in study (Hours)				
1 to 3	187 (28.1)	20 (2.4)	207 (13.8)	<.0001
3 to 6	347 (52.2)	101 (12.1)	448 (29.9)	
more than 6	131 (19.7)	714 (85.5)	845 (56.3)	
Time spent in watching TV/ Computer (Hours)				
1	521 (78.3)	717 (85.9)	1238 (82.5)	.001
2 to 3	126 (18.9)	106 (12.7)	232 (15.5)	
more than 3	18 (2.7)	12 (1.4)	30 (2.0)	
Parents/Siblings using spectacles				
Yes	56 (8.4)	205 (24.6)	261 (17.4)	<.000
No	609 (91.6)	630 (75.4)	1239 (82.6)	1

Table 2: *Comparison of visual acuity of School and Madrasa children*

	Variable	School n=665(%)	Madrasa n=835(%)	Total n=1500(%)	P-value
Right Eye	**Visual Acuity**				
	Normal Vision (6/6)	556 (83.6)	583 (69.8)	1139(75.9)	< .0001
	Myopic	109 (16.4)	252 (30.2)	361 (24.1)	
	Colour blindness				
	No	626 (94.1)	832 (99.6)	1458(97.2)	< .0001
	Yes	39 (5.9)	3 (0.4)	42 (2.8)	
Left Eye	**Visual Acuity**				
	Normal Vision (6/6)	565 (85)	578 (69.2)	1143(76.2)	< .0001
	Myopic	100 (15)	257 (30.8)	357 (23.8)	
	Colour blindness				
	No	626 (94.1)	832 (99.6)	1458(97.2)	< .0001
	Yes	39 (5.9)	3 (0.4)	42 (2.8)	

Table 3: *Frequency of eye complaints among School and Madrasa children*

Common Eye complaints	School n=665(%)	Madrasa n=835(%)	Total n=1500(%)	P-value
Problem in focusing board				
Yes	122 (18.3)	220 (26.3)	342 (22.8)	<.0001
No	543 (81.7)	615 (73.7)	1158 (77.2)	
Blurred vision				
Yes	104 (15.6)	185 (22.2)	289 (19.3)	.001
No	561 (84.4)	650 (77.8)	1211 (80.7)	
Headache				
Yes	214 (32)	376 (45)	591 (39.4)	<.0001
No	451 (68)	459 (55)	909 (60.6)	
Excessive eye blinking				
Yes	25 (3.8)	224 (26.8)	249 (16.6)	<.0001
No	640 (96.2)	611 (73.2)	1251 (83.4)	
Redness				
Yes	124 (18.6)	190 (22.8)	314 (20.9)	.030
No	541 (81.4)	645 (77.2)	1186 (79.1)	
Pain				
Yes	30 (4.5)	89 (10.7)	119 (7.9)	<.0001
No	635 (95.5)	746 (89.3)	1381 (92.1)	
Discharge from eyes				
Yes	187 (28.1)	230 (27.5)	417 (27.8)	.425
No	478 (71.9)	605 (72.5)	1083 (72.2)	
Burning sensation				
Yes	115 (17.3)	127 (15.2)	242 (16.1)	.290
No	550 (82.7)	708 (84.8)	1258 (83.9)	
Foreign body sensation				
Yes	15 (2.3)	112 (13.4)	127 (8.5)	<.0001
No	650 (97.7)	723 (86.6)	1373 (91.5)	
Night blindness				
Yes	24 (3.6)	78 (9.3)	102 (6.8)	<.0011
No	641 (96.4)	757 (90.7)	1398 (93.2)	

compared to 14% of formal school students. This is consistent with earlier studies in Khyber Pakhtunkhwa[12], Baluchistan[11] and Karachi[13], where up to 59%, 17% and 51% of children in madaris were reported to have myopia, respectively, compared to only 2.14% to 8.4% of students from conventional schools. In Israel, 59% of Jewish boys in orthodox and religious institutions had myopia, compared to 12.5 % children from secular schools.[17] This indicates that environmental factors, rather than religious texts, play a crucial role in the development of myopia in children.[8] A distance of less than 25-30 cm for near work has been identified as a risk factor for the development progression of myopia in school-aged children.[18,19] Though the distance between students' eyes and reading material/books was not measured it was observed that students in religious schools keep the books/holy book close to their eyes on a small table whereas in conventional schools, teaching is usually done on a blackboard at a greater distance than in madaris.[11] In the present study, there was a statistically significant association ($p < 0.05$) found between study duration of more than 4 hours and myopia. Previous studies have found a similar link.[20] Shorter reading distances and longer study hours are likely contributing to the high frequency of myopia in our studied madaris students. Colour blindness was observed in (2.8%) of students, which was much greater in both religious and conventional schools. This is in consistent with other study that found colour blindness to be 3.1%.[21] Foreign body sensation (gritty eyes) and night blindness were considerably higher in madaris than in conventional school students ($P < 0.001$). These two symptoms are indicative of Vitamin A deficiency. We did not investigate the causes of vitamin A deficiency and colour blindness further because it was beyond the scope of our investigation. Other studies as well as the present study have consistently documented a favourable link between myopia and family history, difficulty in focusing on a blackboard, headache and blurred vision ($P < 0.001$).[22,23] As in developed world, a mandatory preschool admission eye test followed by periodic follow-up is advised for all school children. This should be more relevant with a special emphasis on religious schools because the majority of the children belong to poor families.[24] There is a need for strengthen efforts to assess gaps and reschedule and reimplement the WHO vision 2020 "right to sight"; the global initiative to end avoidable blindness.

Conclusion

When compared to school children, madaris had a higher prevalence of refractive errors. Children attending madrassas who spent more time studying, watching television or using computers, and had parents or sibling who wore glasses, experienced higher rates of ocular morbidities. Screening of school-age children is critical because early detection and correction of refractive errors will delay/slow the progression.

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Ethical approval: Obtained from IRB of King Edward Medical University.

Authors Contribution:

MK, UH: Involved in conceptualization of study

AR, SU, SKR: Involved in data collection

IS, BA: Involved in manuscript writing

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