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Early Detection of Visual Impairment among Schooling Kids, Dubai Experience, 2016-2017

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Abstract

Globally, uncorrected Refractive errors are the main cause of vision impairment in school children aged 4–17 years, and the prevalence of myopia is increasing dramatically. Objective is to identify the prevalence of vision impairment and associated refractive error among schoolchildren in grades 1, 5 and 9. A cross sectional study was carried out on randomly selected sample of 1719 students, age range (6-11 Years old). Three well-trained optometrists have carried out visual assessment. Assessment setting was four private schools in Dubai. Two clinic sets were provided by Noor Dubai Foundation mobile clinic (fully furnished with vision assessment equipment). The schools were visited during the period from Nov 2016 to Feb 2017. A Snellen 6/9 Visual Acuity Card A measuring tape - for measuring 6 meters distance. A torch light - for external eye examination Baseline data formats Referral forms. A kit bag to store all these materials and A poster with information on signs and symptoms of eye ailments and good eye health practices which will be permanently displayed in the schools. If the child was able to say or point out all the four directions of E in the visual acuity chart, the visual acuity was recorded as 6/9. If not, it was recorded as less than 6/9. The assessment reveals that about 96.1% from the total population of students were with normal vision. On the other hand 3.1% had mild myopia (-0.5 to -3.0), 0.7% moderate (-3.00 to -6.00) and only 0.1% had severe myopia (more than -6.0) requiring further medical attention. On assessing for hyperopia, it was noticed that 99.2% students were normal sighted, with 0.4% having mild hyperopia (-0.5 to -3.0), 0.4% moderate hyperopia (-3.00 to -6.00). Astigmatism was also been assessed for and results showed that about 89.6% of the assessed students were normal, 3.8% had simple astigmatism, 4.2% compound astigmatism and 2.3% had mixed astigmatism respectively. Visual impairments among schooling kids in Dubai are remarkably high with severe visual impairments are not uncommon among screened cohort. A childhood visual screening program needs to be developed and implemented at a wider scale, and effective interventions at primary, secondary and tertiary care levels should be recognized as health care system necessity.

Keywords

Visual Impairment, Population Based Screening, Private Schools, Students, Dubai

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1. Introduction

One of the most important causes of developmental disabilities among children is visual impairment. [1] Substantial long-term implications for the quality of life of the child can result if ocular conditions are undetected or untreated. [2] Globally, uncorrected refractive errors are the

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main cause of moderate and severe visual impairment; cataracts remain the leading cause of blindness in middle- and low-income countries.

According to international classification of diseases-10 (update and revision 2006), visual functions have been classifies to normal vision, moderate visual impairment, Severe visual impairment or blindness. Moderate visual impairment combined with severe visual impairment are grouped under the term "low vision": low vision taken together with blindness represents all visual impairment. [3]

About 285 million people are estimated to be visually impaired worldwide: 39 million are blind and 246 have low vision. An estimated 19 million children are visually impaired, out of which, 12 million children are visually impaired due to refractive errors, a condition that could be easily diagnosed and corrected. It is estimated that 1.4 million are irreversibly blind for the rest of their lives and need visual rehabilitation interventions for a full psychological and personal development. [3]

Previous population based Refractive Error Study in Children (RESC) surveys have conclusively shown that refractive error (myopia) is mainly a problem among children attending schools. Further, these studies have also shown that myopia is also related to the educational / socio economic status of the family, probably related to the emphasis on reading and other near vision tasks associated with school performance. [4] Globally, major causes of visual impairment are uncorrected refractive errors (myopia, hyperopia or astigmatism), 43%; un-operated cataract, 33%; and Glaucoma, 2%. [3]

Vision impairment can affect school performance and other functions, such as ability to safely participate in sports. Strabismus, the most common contributing factor to amblyopia, can also result in loss of stereopsis, leading to impaired depth perception, as well as teasing and other psychosocial consequences. Although amblyopia is often considered a disease of childhood, it is the most common cause of monocular visual loss in adults ages 20 to 70 years. [5] One risk of amblyopia is that vision loss in the nonamblyopic eye can result in severe vision impairment or blindness. One study estimated at least a 1.2 percent lifetime risk for vision loss for an individual with amblyopia. [6] Long-term functional effects of unilateral vision loss related to amblyopia are not well characterized. A study of a 1958 British birth cohort found no differences at ages 33 or 41 years in educational, health, or social outcomes among 8,432 adults with normal vision and 429 adults with amblyopia. [7]

Childhood vision screening and early detection of visual impairment, which are considered cost effective, can prevent long-term serious adulthood eye morbidities such as bilateral visual impairment. [3]

Accordingly surveys utilizing house to house enumeration of children are not necessary in areas where essentially all children attend school. In these areas of high attendance, school-based sampling will provide data essentially equivalent to that obtained with geography based sampling. School based screening has practical implications since it is much easier to carry out. [4]

2. Objectives

To identify the prevalence of vision impairment and associated refractive error (myopia, hyperopia and astigmatism) among school children in grades 1, 5 and 9.

3. Methods

A cross sectional study was carried out on randomly selected sample of 1719 students, age range (6-11 Years old) (grade 1,5 and 9). Three well-trained optometrists have carried out visual assessment. They are affiliated to Dubai Hospital and primary health care services sector at Dubai Health Authority. Assessment setting was four private schools in Dubai: National Charity school, Al Sadiq Private school clinic, Shaikh Rashid Pakistan School, and Al Arqam Private School. Two clinic sets were provided by Noor Dubai Foundation mobile clinic (fully furnished with vision assessment equipment).

The schools were visited during the period from Nov 2016 to Feb 2017. A Snellen 6/9 Visual Acuity Card A measuring tape - for measuring 6 meters distance. A torch light - for external eye examination Baseline data formats Referral forms. A kit bag to store all these materials and A poster with information on signs and symptoms of eye ailments and good eye health practices which will be permanently displayed in the schools. If the child was able to say or point out all the four directions of E in the visual acuity chart, the visual acuity was recorded as 6/9. If not, it was recorded as less than 6/9.

4. Results

Table 1 shows the number and percentage of students investigated in each school. The majority of students were from the National Charity School (41.9%).

Table 1. Number and percentage of students investigated in each School.

School	No.	%
National Charity	720	41.9
Al Sadeq Islamic	464	27.0
Shaikh Rashid Pakistan	335	19.5
Al Arqam private	200	11.6
Total	1719	100.0

Table 2 shows the percentage of students investigated according to grade, sex and nationality. The students were distribution almost equally in three grades 1,5 and 9. Regarding sex distribution of students investigated, males were 53.2%, and females were 46.8%. The sample was classified according to the nationality. It showed that about 5.1% were Emirati, 51.1% were Arabs and 42.8% were from other nationalities.

Table 2. Distribution of students investigated according to grade, sex and nationality.

Variable	Category	No.	%
Grade	1	533	31.0
	5	590	34.3
	9	595	34.6
	Missing	1	.1
Sex	Males	915	53.2
	Females	804	46.8
Nationality	UAE	88	5.1
	Arab	885	51.5
	Others	736	42.8
	Missing	10	.6
Total		1719	100.0

This study revealed that about 72.8% of the total sample visually assessed were having normal vision in right eye, whereas 27.2% were having impaired vision as reflected by table 3. By assessing the left eye, about 73.4% had normal vision whereas, 26.6% of students had impaired vision as reflected by table 3.

Table 3. Distribution of visually assessed students according to presence of impairment in right eye and left eye.

		No.	%	Valid%
Vision in the Right Eye	Normal	1114	64.8	72.8
	Mild	149	8.7	9.7
	Moderate	139	8.1	9.1
	Severe	128	7.4	8.4
	Total	1530	89.0	100.0
Missing		189	11.0	
Vision in the Left Eye	Normal	1123	65.3	73.4
	Mild	151	8.8	9.9
	Moderate	136	7.9	8.9
	Severe	119	6.9	7.8
	Total	1529	88.9	100.0
Missing		190	11.1	
Total		1719	100.0	

Furthermore, by assessing student's vision for common errors of refraction three of them were detected: myopia, hyperopia and astigmatism (table 4). The assessment reveals that about 96.1% from the total population of students were with normal vision. On the other hand 3.1% had mild myopia (-0.5 to -3.0), 0.7% moderate (-3.00 to -6.00) and only 0.1% had severe myopia (more than -6.0) requiring further medical attention.

On assessing for hyperopia, it was noticed that 99.2% students were normal sighted, with 0.4% having mild hyperopia (-0.5 to -3.0), 0.4% moderate hyperopia (-3.00 to -6.00).

Astigmatism was also been assessed for and results showed that about 89.6% of the assessed students were normal, 3.8% had simple astigmatism, 4.2% compound astigmatism and 2.3% had mixed astigmatism respectively.

Table 4. Distribution of myopia, hyperopia and astigmatism among visually assessed students.

		Frequency	Percent	Valid Percent
Myopia	None	1476	85.9	96.1
	-0.5-3.0	48	2.8	3.1
	-3.5-6-	11	.6	.7
	more than -6.0	1	.1	.1
	Total	1536	89.4	100.0
Missing	System	183	10.6	
Hyperopia	None	1524	88.7	99.2
	-0.5-3.0	6	.3	.4
	-3.5-6-	6	.3	.4
	Total	1536	89.4	100.0
Missing	System	183	10.6	
Astigmatism	None	1375	80.0	89.6
	Simple	59	3.4	3.8
	Compound	65	3.8	4.2
	Mixed	36	2.1	2.3
	Total	1535	89.3	100.0
Missing	System	184	10.7	
Total		1719	100.0	

Finally, based on the decision made for students for their further management it was revealed that about 84.8% didn't need any referral, 15.2% only required referral and future medical attention for their eyes health. (Table 5)

Table 5. Distribution of visually assessed students for need of referrals.

	No.	%	Valid%
No need for referral	1302	75.7	84.8
Referred	233	13.6	15.2
Total	1535	89.3	100.0
Missing	184	10.7	
Total	1719	100.0	

5. Discussion

In the current study visual impairments among schooling kids showed high percentages, of different severity and types (sever, moderate, mild): 27.2% in the right eye, and 26.6% in the left eye. Myopia 3.9%, Hyperopia: 0.8% and astigmatism: 10.4%). These results are much less than other studies. Different studies done in different regions of India showed varied results with respect to refractive error prevalence in school children (Madhu gupta et al [8] 22%, Agarwal et al [9] 17.83%). Prevalence of myopia in this study was 18.05%, while in a study done by V Kalikivayi [10] et al in south india it was 8.6%. Such differences in prevalence of myopia could be due to racial variations. Garner et al [11] reported that there was no difference in the prevalence of myopia between girls and boys.

These study findings regarding visual impairments were less than other studies, which showed myopia was the second

most common type of uncorrected refractive error (3.9%). Its prevalence in Qassim was comparable to prevalence reported in Chile (5.8%) [12] and Iran (4.3%), [13] but lower than that in China (14.9%), [14] Malaysia (20.7%), [15] Hong Kong (36.7%) [16] and Singapore (36.3%). [17] The difference in prevalence with the latter studies can be due, in part, to the population age studied (6–13 vs. 5–15/7–15 years old).

This hypothesis is supported by the observation of increased prevalence of myopia with age. RESC studies from China reported notable upward trends for myopia beginning with 7–8 years old groups and coinciding with age at which schooling with intensive near work begins; another upward trend was apparent at 11–12 years old, around the beginning of secondary school and puberty. Thus, it appears that more time spent on near work and less time spent outdoors could have been the major causes of myopia. This hypothesis is also agreed to by various studies showing that higher education level increases the risk of myopia. [18- 28]

As current study showed the severe cases of visual impairment is almost about 9%, it comes near to the other findings in Pakistan which showed 11.4% of the blindness is due to uncorrected refractive errors. [29]

6. Conclusion

Visual impairments among schooling kids in Dubai are remarkably high with severe visual impairments are not uncommon among screened cohort. A childhood visual screening program needs to be developed and implemented at a wider scale, and effective interventions at primary, secondary and tertiary care levels should be recognized as health care system necessity.

Conflict of Interest

The authors declare that they do not have any conflict of interest.

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