

REFRACTIVE ERRORS AMONG SCHOOL CHILDREN IN AQABA / JORDAN

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ABSTRACT

Objective: To assess the refractive errors among school children and to evaluate their eye condition, particularly visual acuity.

Methods: This is a prospective survey that has been performed in Aqaba, at Princess Haya Hospital, eye clinic. A total of 194 children were included: 166 came from public schools with an age range between (6-14) years. The rest were chosen from kindergarten schools with age range between (4-5) years. The period of the survey extended from August 2000 to February 2001 (one semester). Only those with correctable refractive errors as a cause of low vision were included.

Results: More than half of the students (56%) noticed for the first time to have a refractive error were already above the age of 10 years. The highest percentage included those who had difficulty in seeing the blackboard in the classroom, followed by those watching television from a close distance. Only a quarter of these children were referred to the ophthalmologist by the school physician after routine medical checkup. Hypermetropia was more common among children 4-5 years. Myopia was noticed to be more common after the age of 6 years.

Conclusion: This survey showed that there was a delay in presentation to ophthalmologists for refractive error correction, as well as lack of a routine ophthalmic school check-up, which is usually delayed till the fourth grade. We recommend yearly vision check to be started at the age of four years to prevent significant consequences of high refractive errors, like amblyopia, and to achieve a better school performance. A campaign for parental education for early signs of low vision detection is vital.

Key words: Refractive errors, Visual acuity, Amblyopia, School children, School physician.

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Introduction

Vision screening to detect eye problems in school-aged children dates back to at least a century ago. Calls to screen specifically for amblyopia, generally defined as monocular decreased visual acuity, began appearing in the 1950s. However, it was not until the 1960s that animal research indicated that cortical plasticity was limited to a period early in life and that emphasis was placed on vision screening in the preschool years. Since that time, a variety of preschool screening programs have been adopted in various countries⁽¹⁾.

Most of the teaching tools at our schools are visual; the blackboard is the most frequently used. The early

classes at school have the greatest influence on the behavioral and intellectual future of our children. An effort for best well being of the child is mandatory to gain as much as they can and in the easiest way to prepare them for future^(2,3). Visual acuity plays an important role for the achievement of this aim.

A previous study conducted in the northeast of Jordan to assess the ocular status of schoolchildren showed that only 0.45% were found to have anisometric amblyopia due to difference in refraction of 2 diopters (2D) or more between both eyes⁽⁴⁾. An American study found that amblyopia affects approximately 2.5% of children and is the leading cause of unocular visual loss in people aged

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20-70 years. Early diagnosis and treatment can result in a good to excellent outcome ⁽²⁾.

In the rural areas and where you expect to find low educational levels among parents, schools should have the greatest share in early detection of refractive errors. Another important step is to educate the parents for early signs of low refractive errors and the need for a routine checkup.

Methods

The group chosen were all school students from the age of 4 till 14 years in Aqaba city between August 2000 until February 2001. Only those who presented with correctable refractive error as a cause of low vision were chosen.

Only kindergarten children in the age 4 and 5 years were in private schools. The older students were in public schools.

The visual acuity was measured using an E chart. Refraction under cyclopentolate eye drops followed by a subjective post-mydratic test of visual acuity was performed. This group vision measured 6/9 or less in each eye. Glasses were prescribed accordingly.

Details about age, sex, onset of symptoms and other complaints were discussed.

Results

The total number of the students was 194. One hundred and twelve were females (58%), and 82 males (42%).

The age group distribution is shown in Table I.

Table I. Age group distribution.

Age (yr)	No.	%	Notes
4-5	27	14	86% were hypermetropes*
6-9	60	31	47% were hypermetropes and 53% were myopes
10-14	107	55	64% were myopes ± astigmatism
Total	194	100	

* In this age group those with hypermetropia of less than +2.5 D will probably be virtually emmetropic by the age of 14 years.

The percentage of each type of refractive error is shown in Table II.

Table II. Percentage of refractive error distribution.

Types of Refractive Errors	No.	%
Simple* Hypermetropia	62	31
Simple Myopia	47	24
Astigmatism (+ or - Cylinder without a sphere)	38	20
Myopia + astigmatism	33	17
Hypermetropia + astigmatism	14	7
Total	194	100

* Simple: It means without astigmatism, and is not related to the power of the lenses.

Table III. Symptoms at select all check-up presentation.

Symptoms at presentation	No. of patients	%
Inability to see the blackboard clearly	61	31
Watches television from a close distance	50	26
Referred by the school physician after a routine check-up	48	25
Headache	15	8
Nonspecific ocular symptoms (eye itching, frequent blinking...etc)	12	6
Drifting school performance	4	2
Routine check-up	4	2
Total	194	100

The most frequent symptom was the inability to read clearly from the blackboard, followed by the group of students noticed by their parents watching television from a close distance. School physicians referred 25% after a routine check up. Other minor groups were those with nonspecific symptoms, like headache, eye itching, frequent blinking, loss of concentration in the classroom and deteriorating school performance. Only a small percentage of students were brought by parents for check-up.

Discussion

When parallel rays of light come to focus on the retina with the eye in a state of rest (non accommodating), emmetropia exists. Such an ideal optical state is not uncommon, but more often the opposite condition, ametropia, exists. Three principal types occur: hypermetropia, myopia, and astigmatism. The majority of children are physiologically hypermetropic at birth, but a significant number, especially those born prematurely are myopic and there is often some degree of astigmatism. With growth, the refractive state tends to change and should be evaluated periodically.

In hypermetropes (far-sightedness) parallel rays of light come to focus posterior to the retina, so convex lenses are needed to correct it. In myopes (near-sightedness) parallel rays of light come to focus anterior to the retina, thus the principal symptom is blurred vision for distant objects which can be corrected with concave lenses.

In astigmatism there is a difference in the refractive power of the various meridians of the eye. Cylindric or spherocylindric lenses are used for correction.

From the results shown above, it was noticed that the largest group with myopes ± astigmatism were children of ten years old, which is a late age for detection of refractive errors. A point here is that myopia usually starts just before this age, but still other types of refractive errors have a big share in this group; those should have been discovered earlier.

The high percentage of hypermetropes indicates the need for early detection of this group, especially at early school stages, since many of the learning tools like crayons, play dough, blocks, and later pencils require

good near vision for better intellectual development. Also, at this age hypermetropia carries a higher chance of amblyopia. So we need to detect it at a very early stage - even before 4 years - so that we can achieve the best results and prevent amblyopia^(5,6). A study from Oman showed that the main reason for monocular loss of vision in childhood was amblyopia followed by trauma⁽⁷⁾.

Only (48) 25% of our patients were referred by the school physician as children were examined on the fourth grade onwards. Vision should be examined at a much earlier stage.

In the UK, a study showed that the largest referral source was the school nurse-screening program⁽⁸⁾.

The symptom in the majority of students was difficulty in reading clearly from the blackboard. Some parents noticed that the child used to watch television from a close distance. Many parents related this to a habit rather than a genuine problem. A large group was complaining of other less specific symptoms like headache, early loss of interest in the classroom, frequent blinking, decreasing school performance...etc, so they were referred by the general pediatrician to the eye clinic. All this needs an educational program to direct the parents for better observation and early recognition of the problem in their children. Unfortunately, only a small number of patients were brought by the parents for regular check up before school entry, without noticing any symptom.

Girls were brought to the clinic by parents, which refutes the previous idea that poor people give better care for boys over girls and that parents also accept the idea of females wearing eye glasses.

A study from Miami showed that the prevalence of visual impairment was greater in girls than in boys⁽⁹⁾. Another study from Philadelphia showed that only 15 states required vision screening of their preschool aged children⁽¹⁰⁾. In the same study, 76 patients below the age of four years, 63/76 (83%) were brought to the clinic because of squint.

Although the symptom of squint leads to earlier occurrence of refractive error, still we should find another easy way to screen those children at an earlier age even without having squint, as this group is threatened to get amblyopia and detecting the problem before 4 years of age is better for the optimal treatment⁽¹¹⁾. This group is difficult to screen for visual acuity as it is not reliable, until we can use linear letters or symbols⁽¹²⁾. Referring to a study conducted in London, the researchers found that a significant number of young school children (5-8 years) had unsuspected remediable visual defects, 0.67% of those with vision deficiencies who were unaware of it⁽¹³⁾. A good way to screening children was conducted by the Brazilian group that suggested performing vision screening during the vaccination campaigns for simplicity and rapidity⁽¹⁴⁾ and using Arabic letters as recommended by Oduntan *et al*⁽¹⁵⁾.

Conclusion

It can be concluded that it is mandatory to have a fixed program for all children to be examined as early as 4 years of age for any refractive problem, so as to be corrected early. This will give a better chance for those liable for amblyopia to be corrected with good results. Besides, this will have an effect on our children's intellectual development and school performance. This test must be repeated routinely until the sixth grade. We suggest that the child should be examined by an E-chart as a pre-requisite to registration in the kindergarten. Later we might use Arabic letters for young children.

Lectures, publications, and television programs should be directed towards parental education to allow better observation for early detection of signs of low vision in their children.

References

1. **Hartmann E, Dobson V, Hainline L, et al.** Preschool vision screening: Summary of a Task Force Report. *American Academy of Pediatrics* 2000; 5(106): 100-101 (Abstract).
2. **Vanderhoff B, Martin P.** Preventive services in latent years (6-12). *Clinics in Family Practice* 2000; 2 (2): 435-437.
3. **American Academy of Pediatric Committee on Practice and Ambulatory Medicine.** Recommendations for preventive pediatric health care. *Pediatrics* 1999; 96: 373-374.
4. **Tahat A, Abuseif M, Habashneh M, et al.** Ocular status of school children in Northeast Jordan. *JRMS* 1995; 2 (1): 9.
5. **Ruben JB.** It's time to doctor our approach to vision screen. *Strabismus* 1999; 14: 11-12.
6. **Mills MD.** The eye in childhood. *American Family Physician* 1999; 60 (1): 907- 916, 918.
7. **Lithander J, Al Kindi H, Tonjium AM, et al.** Loss of visual acuity due to eye injuries among 6292 school children in the Sultanate of Oman. *Acta Ophthalmol Scand* 1999; 77: 697-699.
8. **Karas MP, Donaldson L, Charles A, et al.** Pediatric community vision screening - a new model. *Ophthal and Physiol Optics* 1999; 19: 295-299.
9. **Lee DJ, Gomez-Marin O, Lam BL, et al.** Prevalence of usual-corrected distance visual acuity impairment in Hispanic and non-Hispanic children and adolescents. *Paediatric and Perinatal Epidemiology.* 2000; 14: 357-362.
10. **Cinar EB, Dobson V, Schmidt PP, et al.** A survey of vision screening policy of preschool children in the United States. *Survey of Ophthalmology* 1999; 43: 445-457.
11. **Kasmann-Kellner BW, Puprecht KW.** Vision screening survey of all children starting primary school in 1998 in the Federal State of Saraland, Germany. *Strabismus* 2000; 8: 201-207.
12. **Rydberg A, Ericson B, Lennerstrand G, et al.** Assessment of visual acuity in children aged 1 1/2 -6 years, with normal and subnormal vision. *Strabismus* 1999; 7: 1-24.
13. **Thomson WD, Evans B.** A new approach to vision

- screening in schools. *Ophthalmic Physiological Optics* 1999; 19:196-209.
14. **Potrio MB, Cardillo JA, De Senne F, et al.** The feasibility of introducing a visual screening test for children during vaccination campaigns. *J Paediatric Ophthalmology & Strabismus* 2000; 37(2): 68-72.
15. **Oduntan AO, Briggs ST.** An Arabic letter distance visual acuity test chart for young children and illiterate adults. *Ophthalmol and Physiol Optics* 1999; 19(5): 431-437.