

Visual Acuity and Refractive Errors in a Sample of Iraqi Schoolchildren in Baghdad 2016

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ABSTRACT

Background: Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness.

Objective: To screen a sample of schoolchildren for visual acuity and any refractive error.

Methods: A descriptive cross-sectional study with some analytic elements in three months duration, from the 15th of October 2016 till the 15th of January 2017. A complete eye examination was done for total 179 children at seven primary schools visited in Baghdad Al-Rusafa. A short talk supported by chart was given to children in the visit. The material taken are E chart, torch light, ruler, direct ophthalmoscope, retinoscope and trial case. Each student undergoes the following examination; VA unaided, PH test and with glasses from 6 meters distance, cover test, examination with torch light, retinoscopy and subjective refraction, fundus examination with direct ophthalmoscope. The diagnostic criteria used in the study were as follows; Myopia if >-0.5 , Hypermetropia if $> +1.0$ D, Astigmatism if > 0.5 D, Amblyopia if VA $<6/12$ (best corrected).

Results: A total of 179 children are included, with an age range from (8-12) years, with a mean of (10 ± 1.56) , more than half of the study sample were female (55.3%), (39) 21.8% have abnormal visual acuity (refractive error), from them, 25 (64.1%) were male, 24 (61.5%) age range from 8-10. Eleven (28.2%) students with refractive error had uncorrected vision between (6/24-6/60), while 8 (20.5%) student had uncorrected vision $<6/60$ causing severe visual impairment, putting these two categories together 19 students (48.7%) had a significant reduction in the visual acuity, it's also seen that 9(23.1%) of children with refractive error could not be corrected to vision 6/9 or better because of amblyopia, while the vision of 30(76.9%) student with refractive error are preventable or treatable. Myopia type of refractive error 17 (43.6%) while hypermetropia 22 (56.4%).

Conclusion: It's seen that 21.8% of the students included in the study were with refractive error. It's also seen that the vision of 76.9% students with refractive error are preventable or treatable.

Keywords: Visual Acuity, Refractive error, Iraqi schoolchildren.

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Visual acuity (VA) commonly refers to the clarity of vision. A common cause of low visual acuity is refractive error (ametropia), or errors in how the light is refracted in the eyeball. Causes of refractive errors include aberrations in the shape of the eyeball, the shape of the cornea, and reduced flexibility of the lens. Too high or too low refractive error (in relation to the length of the eyeball) is the cause of nearsightedness (myopia) or farsightedness(hyperopia) (normal refractive status is referred to as emmetropia).

Other optical causes are astigmatism or more complex corneal irregularities. Refractive errors cannot be prevented, but they can be diagnosed by an eye examination and treated with corrective glasses, contact lenses or refractive surgery⁽¹⁾.

Globally refractive errors are one of the most common causes of visual impairment and second leading cause of treatable blindness. Refractive error is the commonest form of ocular morbidity in primary school children⁽²⁾, although correction of refractive error is easy, safe and effective, many children are without the necessary spectacles⁽³⁾.

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Uncorrected refractive errors are the main cause of visual impairment (VI) in developing countries (43%), followed by cataract (33%)⁽⁴⁾.

Blindness due to refractive error in a specific country suggests that its access to eye care services are in general poor because the management of a refractive error is probably the easiest and most effective eye care service⁽⁵⁾, reduced vision because of uncorrected refractive error is a major public health problem⁽⁶⁾.

Child's vision is most essential for their successful learning, poor vision in childhood affects performance in school and thereby their future⁽⁷⁾.

The Right to Sight is a global initiative launched by WHO in 1999 to eliminate avoidable blindness like cataract, xerophthalmia, refractive error, trachoma and other causes of childhood blindness by year 2020⁽⁸⁾.

The goal of screening for disease and impairments include early detection, early treatment and improved outcomes. Given the functional impact of undetected and untreated vision impairment, many arguments have been made for population-based screening⁽⁹⁾.

The initial office screening of the patient with suspected vision impairment will typically begin with the Snellen wall chart far distance visual acuity and a hand held card, such as the Snellen near acuity card for near visual acuity, further evaluation using ophthalmoscopy, funduscopy or tonometry will depend upon the patients⁽¹⁰⁾.

The aim of this study is to screen a sample of schoolchildren for any refractive error.

Methods

A descriptive cross sectional study with some analytic elements in three months duration, from the 15th of October 2016 till the 15th of January 2017.

The study was conducted in Baghdad in seven primary schools from AL-Rusafa

selected randomly by using one in two systematic random selection.

A sample of 179 students from the schools visited aged from 8-12 years old with a mean of (10±1.56) years.

A short talk supported by chart was given to children in the visit. The material taken are E chart, torch light, ruler, direct ophthalmoscope, retinoscope and trial case.

Each student undergoes the following examination; VA unaided, PH test and with glasses from 6 meters distance, cover test, examination with torch light, retinoscopy and subjective refraction, fundus examination with direct ophthalmoscope.

The diagnostic criteria used in the study were as follow; Myopia if >-0.5, hypermetropia if > +1.0 D, astigmatism if > 0.5 D, amblyopia if VA <6/12 (best corrected).

SPSS (Statistical Package for the Social Sciences) version 20 was used for data entry and analysis, frequency and percentage was used to represent the categorical data. Chi-square test (Fischer exact test when not applicable) was used to confirm significance. P-value<0.05 was considered significant.

Results

According to demographic variables, the age of the study group range from 8-12 years, with a mean of (10±1.56), more than half of the study sample were female (55.3%), (Table 1).

The majority of the study sample with normal visual acuity (78.2%), (Table 2).

Table 3 shows that (64.1%) of those with abnormal visual acuity were male, also 61.5 % of those with abnormal VA aged from 8-10 years.

It seems from table 4 that (28.2%) of children with refractive error had uncorrected visual acuity between (6/24-6/60), while 20.5 had uncorrected vision <6/60 causing severe visual impairment, putting these two categories together 19

students (48.7%) had a significant reduction in the visual acuity, it's also seen that 23.1% of children with refractive error could not be corrected to vision 6/9 or better because of amblyopia.

Table 5 shows the types of refractive error in which (56.4%) have hypermetropia and (43.6%) with simple myopia.

Table 6 shows that (58.8 %) of those with simple myopia were in the age interval of 8-10 years, also (68.2%) of those with hypermetropia aged from 8-10 years, also 88.2% of those with simple myopia were male, while 54.5 % of those with hypermetropia were female.

Table 1: Demographic Data of the study sample.

Variable	Frequency	Percent
Age	8-10	95
	11-12	84
Sex	Total	179
	Male	80
	Female	99
Descriptive statistics of the age	Total	179
	Range	8-12
	Median	10
	Mean	10.13
	SD	1.56
	SE	0.25

Table 2: Visual acuity of the study sample.

Visual acuity	n= 179	%
Normal	140	78.2
Abnormal	39	21.8

P value <0.001

Table 3: Demographic distribution of those with abnormal VA (refractive error).

Sex distribution of those with refractive error	No.	%	Chi square P value
Male	25	64.1	<0.05
Female	14	35.9	
Total	39		
Age distribution of those with refractive error			
8-10	24	61.5	<0.05
11-12	15	38.5	
Total	39		

Table 4: Vision in students with refractive error.

Uncorrected	No.	%
6/9-9/18	20	51.3
6/24-6/60	11	28.2
<6/60	8	20.5
Total	39	
Corrected		
Better than 6/9	30	76.9
Less than 6/9	9	23.1
Total	39	

P value < 0.001

Table 5: Types of refractive error.

refractive error	No.	%
Simple myopia	17	43.6
Hypermetropia	22	56.4
Total	39	

P value >0.05

Table 6: Demographic distribution of students with refractive error.

	Simple myopia		Hypermetropia		Chi square P value
Age	No.	%	No.	%	>0.05
8-10	10	58.8	15	68.2	
11-12	7	41.2	7	31.8	
Total	17		22		
Sex					<0.05
Male	15	88.2	10	45.5	
Female	2	11.8	12	54.5	
Total	17		22		

Discussion

Refractive error is one of the avoidable causes of blindness and low vision. It can restrict progress in education, limit career opportunity and restrict access to information. Therefore, it is essential to understand the pattern of refractive error in schoolchildren to plan effective programs to deal with the problem.

A cross-sectional study was done on a sample of schoolchildren, aged from 8- 12 years. Such program must focus on pre-schoolchildren. This approach presents considerable challenges, as examining young children and measuring their visual acuity or refractive error is difficult, particularly in a non-clinical setting.

Similar study taking school age children was done in Katmandu⁽¹¹⁾, New Delhi⁽⁶⁾, India⁽¹²⁾ and that one done in urban Chinese⁽³⁾, while a study done in Australia took only 12 years old children⁽¹³⁾.

This study shows that (78.2%) of the students included in the study were with normal visual acuity, while in a study done in South Nigeria found About 97.7% of eyes had normal vision of 6/6, refractive error was present in 192 (8.58%)⁽¹⁴⁾, however refractive error in Niroula 2009 reported 6.43% in Pokhara⁽¹⁵⁾, Kassa 2003 reported 7.6% in Ethiopia⁽¹⁶⁾. But different prevalence rates were found in other population based studies, e.g. Jialiang 2000 in 12.8% in China⁽¹⁷⁾ and Trivedi 2006 in 2.7% in Gujrat ⁽¹⁸⁾, These findings suggest that there is a variation in refractive error in different geographical regions.

This study found that male had refractive error more than female, which is similar to a study done in Nepal by Shrestha GS. Who found that male (9.8%) had significant prevalence of refractive error than female⁽¹⁴⁾.

This study shows that (23.1%) of children with refractive error had already developed amblyopia and this compare well with a study done in Katmandu which found that (12.4%) of children with refractive error could not be fully corrected⁽¹¹⁾, also compare well with a study from China (5%)⁽³⁾.

In this study myopia seems to decrease with age, although the association statistically was not significant (P value >0.05) while in a study done in Katmandu by Bp Napel, which found that myopia increase steadily with age⁽¹¹⁾. Shrestha GS found in his study that myopia increased as age advanced, hyperopia and astigmatism initially increased but later decreased with age⁽¹⁴⁾.

Hypermetropia also in this study seems to decrease with age although the association statistically was not significant (P value >0.05) and this goes well with a study done in New Delhi, which found that there is an age related shift in refractive error from hyperopia in young children toward myopia in older children⁽⁶⁾.

In this study myopia was more in male, this finding is similar to a study done in New Delhi⁽⁶⁾, China⁽³⁾ and Chile⁽¹²⁾.

In conclusion: It's seen that 21.8% of the students included in the study were with refractive error and the vision of 76.9% students with refractive error are preventable or treatable.

Recommendation: A school eye screening intervention program with periodic evaluation seems to be appropriate for countries like Iraq as most of the eye diseases found are preventable or treatable.

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