

Prevalence of Refractive Errors in School Children (12-17 Years) of Tafila City

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Abstract:

Objective: To study the prevalence of refractive errors in school children (12-17 years) of Tafila city by age, sex, class and type.

Study design: Cross-sectional study in schools of Tafila city conducted from September 2004 to March 2005 for 1,647 school children which included 828 males and 819 females analyzed by Chi square test, proportions.

Results: 25.32% of the students were found to be having refractive errors. Of these 47% were females and 53% were males. The distribution of refractive errors was: Myopia - 63.5%, Hypermetropia 11.2% and astigmatism 20.4%.

Conclusions: These data support the assumption that vision screening of school children in developing countries could be useful in detecting correctable causes of decreased vision especially refractive errors and in minimizing long term visual disability.

Keywords: Prevalence, Refractive errors, Myopia, Hypermetropia, School children, Age, Sex, Class

Introduction:

Emmetropia is the state in which parallel rays of light come to focus on the retina with the eye at rest. Such ideal optical state is common in contrast to the opposite condition **ametropia** that is often exists. Three main types are considered as refraction errors: hyperopia (farsightedness), myopia (nearsightedness) and astigmatism.¹ The prevalence of myopia is currently attracting worldwide attention as many recent studies report dramatic increases over the last 20 years^{2,3}. In Jordan, approximately 1/3 of the population is in the school age⁴. Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of the child. Moreover, planning of a youth's career is very much dependent on the visual acuity, especially in jobs for navy, military, railways and aviation⁵. This warrants early detection and treatment of refractive errors to prevent permanent disability.

The present study was carried out in the schools of Tafila city. Students of the age group 12-17 years were chosen because refractive errors were found among 45% of examined schoolchildren in United Arab Emirates⁶ and in Al-Baha region of Saudi Arabia.⁷ which are some neighboring countries. **This study** presents the prevalence of refractive errors by age, sex, class, type of error and socio-economic status among school children of Tafila city. The mean age of onset of refractive errors was computed. This information may be used for planning appropriate eye care programme for the high risk groups in order to reduce the burden of visual impairment in the population.

Tafila is a southern city of Jordan. There are approximately 60 schools in the city. Students in the age group 12-17 years studying in classes 7th-12th were included in the study. Assuming a 20% prevalence of refractive errors based on a pilot study, the sample size was calculated to be 1526 for this cross-

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sectional study. However, 1714 students were selected, of these 67 students remained absent during study period and could not be examined. Students of 10th, 11th, and 12th classes were busy preparing for their examinations so their number was less.

Method

The students were examined in their respective classes. The screening was done in the following way. From a six meters distance, the student was shown the E-card with four E's of standard size (6/9 of Snellen's chart). For each eye the child had to indicate the direction of open end of E. Simply rotating the card, the sequence could be changed. The child either indicated the direction correctly (*eye sight good*) or incorrectly (*eye sight not good*). In case of doubt the eye sight was recorded as not good. Children with visual acuity less than 6/9 were sent for subjective refraction test. Subjective refraction was performed by achieving best corrected visual acuity, while Cycloplegic refraction was advised for students when best corrected visual acuity could not be achieved. Students presenting organic defects in eye such as corneal opacity, opacity of the lens, choroid and retinal disorders were excluded from study. It must be mentioned that students were screened only for distant vision. Therefore, the number of hypermetropic students was far less than the myopic ones.

Results:

Age, sex and class distribution:

Amongst 1,647 students who were examined, 828 were males and 819 were females. The age of the students ranged from 11 to 17 years. The mean age was 13.22 years, median age was 13 years. In this study (417) students (25.32%) were found to have refractive errors. Of these 196 (47%) were females and 221 (53%) were males. There were no significant differences in refractive errors found between males and females (**Table IA**).

Table IA: Sex-wise distribution of students with and without refractive errors.

Sex	Refractive errors			
	Yes	(%)	No.	(%)
Males	221	(26.7)	607	(73.3)
Females	196	(23.9)	623	(76.1)
Total	417		1230	

The optical states: myopia was found in 265 (63.5%), hypermetropia in 47(11.2%) and astigmatism in 85 (20.4%) cases (**Table 1B**).

Table 1B. Optical states:

Optical state	No.	%
myopia	256	(63.5%)
hypermetropia	47	(11.2%)
astigmatism	85	(20.4%)
Sum	417	100

The percentage of ametropic students in the 10th to 12th grades was significantly higher (d value = 3.96, $p < 0.05$) than the percentage of ametropic students in the 7th to 9th grades (**Table II**) and the percentage is also increased by increasing age (**Table III**).

Table II: Class-wise distribution of students with and without refractive errors.

Class	Refractive errors				Total
	Yes	(%)	No	(%)	
7	134	(23.3)	441	(76.7)	575
8	91	(20.7)	347	(79.3)	438
9	127	(27.1)	342	(72.9)	469
10	39	(43.8)	50	(56.2)	89
11	12	(36.4)	21	(63.6)	33
12	14	(32.6)	29	(67.4)	43
Total	417		1230		1647

Table III: Age-wise distribution of students with and without refractive errors.

Age	Refractive errors				Total
	Yes	(%)	No	(%)	
11	2	(6.7)	28	(93.3)	30
12	125	(24.5)	386	(75.5)	511
13	111	(22.5)	382	(77.5)	493
14	101	(25.9)	288	(74.1)	389
15	52	(36.0)	93	(64.0)	145
16	22	(31.9)	47	(68.1)	69
17	4	(40.0)	6	(60.0)	10
Total	417		1230		1647

It was found that Most of these children (277 representing 66.4%) were aware of their refractive errors, whereas, 140(33.6%) were unaware of the problem. The mean age of onset of the refractive errors in these cases was 11.22 ± 2.07 years and the median age was 12 years (**Table IV**)

Table IV: Age of onset of refractive errors.

Age of onset	No of cases	Percentage
5	4	1.4
6	4	1.4
7	8	2.8
8	12	4.2
9	22	8.0
10	38	13.8
11	51	18.4
12	65	23.5
13	49	17.7

14	14	5.1
15	8	2.9
16	1	0.4
17	1	0.4
Total	277	100

Discussion:

The results of our study are similar to these carried out by Laatkainen⁸. It is during this period, the children are at risk of developing refractive errors, because they are actively growing and subjected to the strain of near work due to demanding academic schedules. Such a population is likely to have more number of myopics.

In the age groups that we have studied, the prevalence of refractive errors also varies with age. Significant differences in the prevalence between age groups and classes have been demonstrated in our study (tables II and III). In this period, with increasing age, children are subjects to cope with school and academic activities. The increase in prevalence of myopia found in our study is probably related to the increased demands for academic schedules. This could represent a risk factor for developing refractive errors in this age group.

Refractive errors found in our study did not differ significantly between males and females (tab IA). In one study, it was shown also that no significant differences in refractive errors between males and females⁹. However, in other studies^{10, 11} refractive errors were found to be more common in girls than in boys. In these studies the differences were related to the possible differences in the rate of growth between girls and boys. Girls attain puberty earlier on an average and reach their final body weight 1-2 years earlier than boys.

Conclusion:

The data support the assumption that vision screening of school children in developing countries could be useful in detecting correctable causes of decreased vision especially refractive errors and in minimising long term visual disability.

Recommendations:

The present study shows that the adolescent age represents high risk group for refractive errors. Most of the children are unaware of their refractive errors. Therefore, screening in school and pre-school ages should be carried out periodically. In addition, children in these ages and their parents should be educated about signs and symptoms of refractive errors, ocular hygiene and for the risk factors involved in the development of these errors and other ocular pathological problems. During screening for refractive errors, adequate arrangement and illumination and clarity of the chart must be considered and ocular fatigue should be avoided.

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