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Research Article

**PREVALENCE OF VISUAL IMPAIRMENT AMONG  
SCHOOLCHILDREN IN Makkah****Enas H. Alfalogy<sup>1</sup>, Enas M. Munshi<sup>2</sup>, Suhaila K. Qari<sup>2</sup>, Sarah K. Alem<sup>2</sup>,  
Leena A. Alharthi<sup>2</sup>, Husam A. katib<sup>2</sup>**<sup>1</sup>Department of Family Medicine, Faculty of Medicine, Suez Canal University, Ismailia, Egypt<sup>2</sup> M.B.B.S Faculty of Medicine Umm Alqura University, Makkah, KSA**Abstract:**

**BACKGROUND:** The updated estimate for visual impairment in children is needed for planning to improve the quality of life of schoolchildren. Almost 18.9 million school children below 15 years of age suffer from visual impairment worldwide. In developing countries, up to 31% of childhood visual impairment and blindness is avoidable and preventable.

**AIM OF THE STUDY:** to estimate the prevalence of visual impairment and its impact on school achievement.

**METHODS:** a cross sectional descriptive study was conducted using the multistage random sample as 10 elementary schools were selected by Simple random selection from 374 elementary schools in Makkah, then students from chosen schools were selected by the stratified random sample from both genders. Visual acuity was assessed by Snell's chart for 392 apparently healthy children during April 2018 to May 2018 and using The World Health Organization classification for visual impairment.

**RESULTS:** Out of 392 participants, 218 (55.6%) were males and 174 (44.4%) were females. A total of 106 (27%) children presented with normal visual acuity (VA) in the right eye and 111 (28.3%) children had normal visual acuity in the left eye. 200 (51%) and 184 (46.9%) had near normal vision in right and left eye respectively. Regarding visual impairment, 57 (14.5%) and 67 (17.1%) had a moderate visual impairment in right and left eye respectively. While 29 (7.4%) had a severe visual impairment in each eye, and only one (0.3%) had blindness in the left eye. The majority of 310 (79.1%) had Excellent grades. Only 4.8% had learning difficulties noticed by their parents. Children with visual impairment were referred for further evaluation.

**CONCLUSION:** In conclusion, Visual impairment is common among schoolchildren and affecting both eyes. Cost-effective strategies were needed to address easily treated causes of vision impairment.

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**INTRODUCTION:**

Vision impairment in childhood has serious consequences in all stages of child's growth and development. It poses educational and social challenges, with affected schoolchildren being at greater risk of having bad behavior, emotional and psychological problems, lower self-esteem and inappropriate social integration. Imagine a child who is poorly behaved at school and obtaining bad grades. Your initial thought may well be that the kid has a learning disability. However, you furthermore may need to think about the likelihood that the child has vision problem; it's a lot of common than now especially with all this technology And the long hours that the child spend on TV or tablet, often vision abnormality, whether mild or severe, encompasses a deeply negative result on educational performance.

The most recent study by WHO in 2010 show that globally the principal causes of visual impairment are uncorrected Visual impermanent 43% and cataracts 33 %. Other causes are glaucoma, 2%, age-related macular degeneration on (AMD), diabetic retinopathy, trachoma and corneal opacities, all about 1%<sup>1</sup>. An estimated 19 million children are visually impaired. Of these, 12 million children are visually impaired because of errors of refraction, a condition that might easily diagnosed and corrected<sup>2</sup>.

In Regard to the prevalence of visual impairment in Saudi Arabia, it is not well defined especially, among children. One study in Riyadh was conducted about Prevalence of Visual impermanent among pre-school children in 2009 that showed Out of the 1319 children, 60 children were diagnosed as having Visual impermanent (4.2% in boys and 4.9% in girls) Myopia (2.5%) hyperopia (2.1%), astigmatism (2.5), amblyopia (0.5%), and strabismus (0.5%)<sup>3</sup>.

Another research was done in Al-Hassa reveal screened schoolchildren; the overall prevalence of Visual impairment was 13.7%, higher among females and significantly more among students of rural residence. Only 9.4% of students with poor vision were wearing spectacles for correction. Myopia was the most commonly encountered Visual impairment in both genders<sup>4</sup>.

Vision screening is a very important way to establish vision impairment. The updated estimate for visual impairment in children is needed for planning to improve the quality of life of schoolchildren. The American Academy of Ophthalmology (AAO) suggests that children at school age get a vision screening every 1 or

2 years by a physician.

Vision is significantly affects speech and language development, reading and writing development, communication and behavioural skills that affect educational experience and relationships with other people. These problems have a significant impact on the child life that is why it particularly important to screen for visual impairment as earlier as possible.

**OBJECTIVES:**

- Objective of this study is to estimate prevalence of vision impairment in Makkah among elementary school children.
- To identify the relationship between visual impairment and school performance.
- To identify the risk factors for visual impairment among school children.

**METHDOLOGY:**

The aim of our study is to do vision screening tests to estimate the prevalence of visual impairment among schoolchildren in Makkah.

**3.1 POPULATIONS:**

Elementary Schoolchildren between 6 – 12 years old. One reason also for this is that schools demand more work from the children sight, which could discover any problems that weren't seen before.

The sample was chosen from elementary level children who appeared healthy and don't Complain of any visual problems.

Among 374 elementary schools, around 187 boy's school & 187 girl's schools are distributed to the middle, East, West, North & south of Makkah. A multistage random sample was used to select schools then students from chosen schools were selected by the stratified random sample from both genders.

**3.2 SAMPLE:**

The consent forms were distributed to the selected schools to obtain the children's parents approvals. Children with known visual problems were excluded.

Sample size was estimated as 392 randomly selected students based on prevalence of 13.7% and according to the following equation

$$\frac{(1.96)^2 pq}{d^2}$$

Where  $q = 1 - p$ , 95% confidence interval for proportion  $p$  with margin of error  $d$  0.05.

Interview of participants was met the general protocols and procedures for interviewing and oral question and after obtaining the consent from parents. The consent includes full information about the research including the reasons they have been chosen to participate.

Participants' privacy, confidentiality and anonymity were guaranteed.

Similarly, the schools being selected for the research were given permission for Access to archival material and documents needed in the study.

The visual impairment assessment was taken place inside the student school itself in their normal school day; they were excused from the class for 10 to 15 minutes maximum for conducting the interview and assessment.

#### **INSTRUMENTS:**

Snellen chart was used to assess Visual impairment among the students. An eye shield was needed for the younger age to cover there's eye during the examination.

The World Health Organization classifications of visual impairment were used to classify children with visual impairment.

- 20/30 to 20/60 is considered a near-normal vision.
- 20/70 to 20/160 is considered moderate visual impairment.
- 20/200 to 20/400 is considered severe visual impairment.
- A person with 20/200 in the better eye is considered blind.

Data entry and statistical analysis was done using SPSS 23.0 statistical software package. Data is presented using descriptive statistics as frequencies and percentages for qualitative categorical variables, and means and standard deviations for quantitative continuous variables. To assess the statistical differences in percentage on qualitative variables Chi- Square test was estimated with P a value less than 5 %.

#### **RESULTS:**

Out of 392 participants, 218 (55.6%) were males and 174 (44.4%) were females. The age of the children ranged from 6 to 12 years with a median age of 9.5 years. The 6<sup>th</sup> and 5<sup>th</sup> classes had the highest proportion of respondents at 22.7% and 19.6%, respectively. This followed by 4<sup>th</sup> and 2<sup>nd</sup> classes at 16.8% and 15.6%, respectively, and the lowest proportion was the 1<sup>st</sup> class at 11.2%. The majority of 310 (79.1%) had Excellent grades. Only 4.8% had learning difficulties noticed by their parents.

15.8% of parents had screened their children for visual impairment previously; and most of them did not have any reason behind the second screen except caring. Socio demographic characteristics are shown in (Table1)

According to risk factors of eye problem, 9.9% had a family genetic disease such as Visual impairment while only 2.6% had a chronic disease such as diabetes mellitus, Asthma and anaemia. 3.6% of children on regular medications for their diseases such as Insulin, Salbutamol and vitamins. Almost one-half 183 (46.7%) spend 2 hours on an electronic device.

**TABLE 1:** Socio-demographic characteristics of the participants, (N =392)

Variable	Frequency (N)	Percent (%)
<b>Gender</b>		
Male	218	55.6
Female	174	44.4
<b>Age</b>		
Median age 9.5 years (6-12 years)		
<b>Class</b>		
1st	44	11.2
2nd	61	15.6
3rd	55	14
4th	66	16.8
5th	77	19.6
6th	89	22.7
<b>Grades</b>		
Excellent	310	79.1
Very Good	60	15.3
Good	16	4.1
Poor	6	1.5
<b>Learning difficulties that the parents noticed</b>		
Yes	19	4.8
No	373	95.2
<b>Previous screening</b>		
Yes	62	15.8
No	330	84.2
<b>Genetic disease in a family</b>		
Yes	39	9.9
No	353	90.1
<b>Consanguinity between parent</b>		
Yes	154	39.3
No	238	60.7
<b>Chronic disease</b>		
Yes	10	2.6
No	382	97.4
<b>Eye problems</b>		
Yes	51	13
No	341	87
<b>Medications</b>		
Yes	14	3.6
No	378	96.4
<b>How much the child spend on an electronic device (Hours)</b>		
2	183	46.7
3	88	22.4
4	59	15.1
5 or more	62	15.8

### Clinical manifestation of eye screening

192 (41%) of respondents did not complain of any ocular symptoms. Out of 392, 80 (17%) complained of itching, followed by 75 (16%) who had redness, 37 (8%) who had photophobia, 47 (10%) holding book too close, while only 37 (8%) tilting the head to see better (Figure 1).

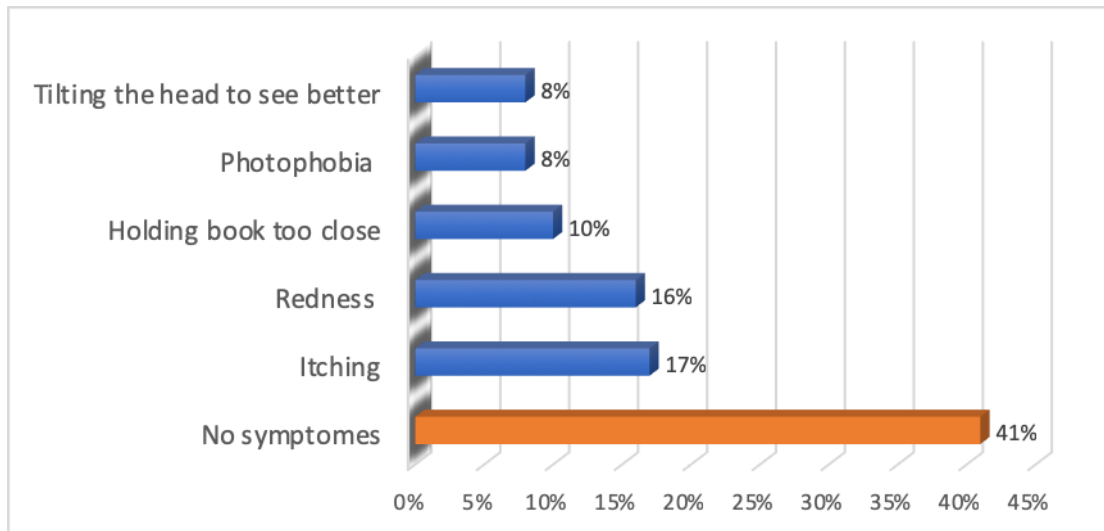


FIGURE 1: Visual impairment symptoms among Makkah elementary school children.

### Visual acuity (VA) assessment

A total of 106 (27%) children presented with normal VA (6/6) in the right eye and 111 (28.3%) children had normal VA in the left eye. 200 (51%) and 184 (46.9%) had near normal vision in right and left eye respectively. Regarding visual impairment, 57 (14.5%) and 67 (17.1%) had moderate visual impairment in right and left eye respectively. While 29 (7.4%) had severe visual impairment in each eye, and only 1 (0.3%) had blindness in left eye (Figure 2).

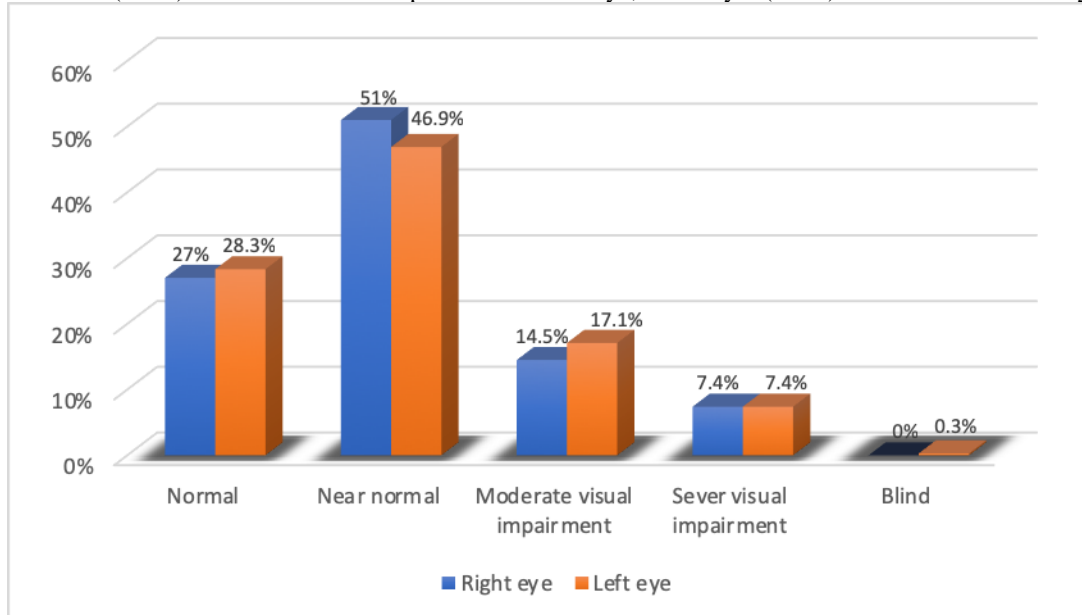


Figure 2: Distribution of uncorrected visual acuity for the right and left eye by percentage.

### Prevalence of visual impairment

The screening of right eyes for visual impairment among 392 school-aged children is shown in Table 2. The prevalence of visual impairment increased in males.

With statistically significant difference between genders ( $p = 0.002$ ).

**TABLE 2: Prevalence of visual impairment in right eye among school-aged children by age groups, gender and school grade.**

Category	Normal		Near normal		Moderate visual impairment		Severe visual impairment	
	N	%	N	%	N	%	N	%
<b>Gender (<math>P = 0.002</math>)*</b>								
Male	73	33.5	102	46.8	24	11.1	19	8.7
Female	33	18.9	98	56.3	33	18.9	10	5.7
<b>Grades (<math>P = 0.101</math>)</b>								
Excellent	85	27.4	167	53.9	40	12.9	18	5.8
Very Good	16	26.7	24	40	12	20	8	13.3
Good	4	25	5	31.3	5	31.3	2	12.5
Poor	1	16.7	4	66.7	0	0	1	16.7

\* Significant difference

The screening of the left eye for visual impairment among 392 school-aged children is shown in Table 3. The prevalence of visual impairment increased in males. Moreover, children who had severe visual impairment were associated with poor grade. With statistically significant difference between gender ( $p = 0.002$ ) and grades ( $p = 0.032$ ) respectively.

**TABLE 3: Prevalence of visual impairment in left eye among school-aged children by gender and performance grades.**

Category	Normal		Near normal		Moderate visual impairment		Severe visual impairment		Blind	
	N	%	N	%	N	%	N	%	N	%
<b>Gender (<math>P = 0.10</math>)*</b>										
Male	76	34.9	88	40.4	37	17	17	7.8	0	0
Female	35	20.1	96	55.2	30	17.2	12	6.8	1	0.6
<b>Grades (<math>P = 0.032</math>)*</b>										
Excellent	87	28.1	156	50.3	42	13.5	24	7.7	1	0.3
Very Good	19	31.7	22	36.7	16	26.7	3	5	0	0
Good	4	25	3	18.8	8	50	1	6.3	0	0
Poor	1	16.7	3	50	1	16.7	1	16.7	0	0

\* Significant difference

On the other hand, there was no significant difference between visual impairment and family genetic disease, parent consanguinity, chronic disease, and other factors.

Finally, examination revealed that all of the children had no abnormalities in each of pupil's size, shape, and symmetry.

### DISCUSSION:

Data on prevalence, distribution, and determinants of visual impairment is needed to plan and provide better eye care services to reduce visual impairment among children. The present study carried out to measure the prevalence of visual impairment among

6–12-year-old school students in Makkah, Saudi Arabia.

The majority of participants (78%) had visual acuity within normal and near normal limits according to the WHO definition, and those who had visual impairment constituted 21% in addition to only one participant (0.3%) that were blind in the left eye. As the number of blind participants was very minimal, and because it considered a subset of visual impairment, the overall prevalence of severe visual impairment considered to be 7.4%.

Vision is significantly affecting reading and writing development, this could be justified the significant

relation between visual impairment and grades.

Krishnamurthy et al. (1) also reported a prevalence of 6.5% of visual impairment in a study conducted at Mysore. Murthy et al. (2) in a study done at Andhra Pradesh observed the prevalence of visual impairment of 6.7% in right eyes and 6.5% in left eyes.

Our results revealed a significant correlation between gender and the prevalence of visual impairment. It was higher in males. A study by Attebo and Mitchell in Australia found that the prevalence of visual impairment was higher in females than in males (3). However, Michon and Lau reported that prevalence was higher in males (4). Studies by Megbelayin and Asana in Nigeria and Pi et al. in Western China who found no significant correlation between sex and prevalence of visual impairment (5, 6). The sex difference in the prevalence of visual impairment is the result of differences in constitution, population distribution, and behavior of children and the social status of females, income, and other factors.

### 5.2 Strengths

To our knowledge, no similar study has been conducted in Makkah; thus, the data obtained makes a valuable contribution to the understanding of eye health challenges in this region.

### 5.3 Limitations

This study has some limitations, it was conducted in only Makkah city in Saudi Arabia. Therefore, the obtained results cannot be generalized to the whole population in all the country.

In addition, we conducted all the clinical eye examinations in the schools to improve the participation rate. However, conditions such as illumination, ventilation and comfort were different from school to school. Moreover, the number of schoolchildren decreased in lower-grade levels, which may introduce bias in the results of visual impairment.

Refraction was not performed to the students because of no feasibility. Further large-scale analytical studies may be required to establish strong evidence regarding the causes and most common determinants of visual impairment.

### CONCLUSION:

In conclusion, the present study reports for the first time an analysis of visual impairment of primary school students in Makkah. Visual impairment was found among a quarter of the population with the left eyes slightly more affected than the right eyes.

Nearly 7% of patients had severe impairment and were referred for further evaluation. Cost-effective strategies were needed to address these easily treated and avoidable causes of vision impairment.

### RECOMMENDATION:

- A pre-school eye examination is recommended to be done so the child has a chance for learning effectively and will help to detect visual impairment before occurrence of further complications.
- Further study to be done on a broad-spectrum of the visual assessment among schoolchildren.
- Doing a full visual examination to have more full view on the eyes condition.
- Future research is needed to assess the most common causes for visual impairment in Saudi Arabia.

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Ethics approval

SFHM IRB registered at the National BioMedical Ethics Committee, King Abdulaziz City for Science and Technology (Registration no. HAP-02-K-052)

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### REFERENCES:

1. Blindness and vision impairment, World Health Organization. October 2018
2. Mohammad A. Al-Rowaily : Prevalence of refractive errors among pre-school children at King Abdulaziz Medical City, Riyadh, Saudi Arabia, Saudi Journal of Ophthalmology, Elsevier, April-June 2010
3. Al Wadaani, Fahd Abdullah et al. "Prevalence and pattern of refractive errors among primary school children in Al Hassa, Saudi Arabia" Global journal of health science vol. 5, 1 125-34. 11 Nov. 2012
4. Maya Chupkov, The Importance of Back-to-School Vision Screening, American Academy of Ophthalmology, Aug. 27, 2015

5. Jialiang Zhao, Xiangjun Pan, Ruifang Sui, Sergio R. Munoz, Robert D. Sperduto, Leon B. Ellwein. Refractive error study in children: results from Shunyi District, China American Journal of Ophthalmology, Elsevier April 2000
6. Eugenio Maul, Silviana Barroso, Sergio R. Munoz, Robert D. Sperduto, Leon B. Ellwein. Refractive error study in children: results from La Florida, Chile. American Journal of Ophthalmology, Elsevier April 2000
7. Tarek Tawfik Amin. Ataur R Khan. Prevalence and Pattern of Refractive Errors among Primary School Children in Al Hassa, Saudi Arabia, Article in Global journal of health science · January 2013
8. Gopal P. Pokharel, A.Dominique Negrel, Sergio R. Munoz, Leon B. Ellwein. Refractive error study in children: results from Mechi Zone, Nepal. American Journal of Ophthalmology. Elsevier April 2000.
9. Niskar AS, Kieszak SM, Holmes A, Esteban E, Rubin C, Brody DJ. Prevalence of Hearing Loss among Children 6 to 19 Years of Age The Third National Health and Nutrition Examination Survey. *JAMA*. 1998; 279(14):1071–1075. doi:10.1001/jama.279.14.1071
10. Bourne RRA, Flaxman SR, Braithwaite T, Cicinelli MV, Das A, Jonas JB, et al.; Vision Loss Expert Group. Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. *Lancet Glob Health*. 2017 Sep; 5(9):e888–97.
11. Fricke, TR, Tahhan N, Resnikoff S, Papas E, Burnett A, Suit MH, Naduvilath T, Naidoo K, Global Prevalence of Presbyopia and Vision Impairment from Uncorrected Presbyopia: Systematic Review, Meta-analysis, and Modelling, *Ophthalmology*. 2018 May 9.