



## PREVALENCE OF UNCORRECTED REFRACTIVE ERRORS AMONG THE INTERNALLY DISPLACED SCHOOL CHILDREN IN IRAQ

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### ABSTRACT

**Purpose:** The aim of this study was to estimate the prevalence of uncorrected Refractive errors among the internally displaced school children in Iraq. **Methods:** School-based cross-sectional study in the academic year of 2016-2017. School children were selected from 8 primary schools for the internally displaced Children in Kurdistan region, Iraq. All children underwent full ophthalmic examination, uncorrected visions were tested and cycloplegic refractions were done for children with visual impairment. Refractive errors in this study were determined by the results Of the cycloplegic refraction. **Results:** From 592 selected children, 94.7% had participated in our study, and 553 were eligible (age ranged from 6 to 12 years). The prevalence of refractive errors was 34.5%; 32.2% of them were uncorrected. The prevalence rates of myopia, hyperopia And astigmatism were 3.8%, 13.9% and 14.9%, respectively. **Conclusion:** This study has found a high prevalence of uncorrected refractive Errors among the internally displaced children in Iraq. This result represents an important health issue among those children, requiring major actions to tackle and Resolve it.

**KEYWORDS:** Internally displaced children, Cross-sectional study, Refractive errors, Prevalence, Iraq.

### INTRODUMION

Refractive errors (RE) affect a large proportion of the world's population, regardless of their age, gender and ethnicity.<sup>[1]</sup> According to the World Health Organization (WHO), uncorrected refractive error is considered as the leading cause of avoidable blindness and visual impairment worldwide, with estimated number of 12 million of schoolchildren aged 5 to 15 years worldwide affected. Uncorrected refractive error has great impediment on the individual's education, personality development and career opportunities, along with its economic burden on society.<sup>[1]</sup> Therefore, the need for an effective screening programs to detect individuals with refractive error is rising in the recent years. VISION 2020- The Right to Sight, is the global initiative set by WHO to prevent the visual impairment resulting from the uncorrected RE. One of its strategies is to include a simple visual acuity test into the school health programs, and to perform spectacles provision to children with significant refractive errors. Provision of appropriate spectacles is considered as a simple, cost-effective strategy in order to improve vision.

In Iraq, as a result of the violence and conflicts in the past decade, more than 1.7 million persons, including over 900,000 children, had fled their homes and are living in camps or homes in the Kurdistan region of the country<sup>1 65</sup>.

To our best knowledge, there are no available data or information regarding the prevalence of visual impairment among these internally displaced children. Therefore, this study aimed to draw attention to the on going health problems of the internally displaced people by determining the prevalence of the uncorrected refractive errors among the displaced schoolchildren.

### MATERIAL AND METHODS

#### Study area and sampling

A cross-sectional school-based study was carried out among primary schoolchildren in the academic year of 2016 - 2017. The students were recruited from 8 primary schools for internally displaced children located in Kurdistan region, North Iraq. The study included all the cooperative students of both genders from these schools after obtaining informed consents from their parents or guardians. The age of students included in the study ranged from 6 to 12 years; since in Iraq, children enroll in the elementary schools at age of 6 years, and the duration of study is six years.

#### Ophthalmic Examination

All the medical procedures were performed by trained ophthalmologists and optometrists. Examination included full ophthalmic history, slit lamp examination, and uncorrected visual acuity (UCVA) using Snellen's

(E letter) chart at 6 meters' distance. Those with UCVA of 6/12 or worse in the better eye were declared to have defective vision and were examined by cycloplegic autorefractometry using (Topcon KR 8000), and appropriate spectacle corrections were given. Children already wearing spectacles at time of examination were also examined and any changes in refractive errors were noted. The visual acuity, types of refractive error and correction were noted down in a self-designed proforma.

### Definitions

Normal vision was defined as an UCVA of 6/9 or better in at least one eye. Visual impairment was defined as an UCVA of 6/12 or worse in the better eye. Refractive errors were classified into myopia, hyperopia and astigmatism. Myopia was defined as a spherical equivalent (SE) of  $< -0.50$  diopter (D), hyperopia as  $SE > +2.0$  D, and astigmatism as a cylinder of  $> 0.50$  D. Astigmatism was further classified into: simple myopic, simple hyperopic, compound myopic, compound hyperopic and mixed astigmatism.

### Statistical Analysis

The prevalence of RE was calculated as the ratio of the number of subjects with RE to the total number of the children studied. The prevalence of different types of RE (myopia, hyperopia, and astigmatism) was presented as percentage. Microsoft excel package and SPSS software (IBM Version 23) were used for the data analysis.

### Ethical Issues

Ethical approval for this study was obtained from the

Scientific Committee of University of Fallujah / College of Medicine before any measurements were carried out. The school principals also approved this study. Written informed consents were obtained from the children's parents or guardians.

## RESULTS

### Study population

A total of 592 students from 8 primary schools for internally displaced children in Kurdistan region, Iraq, were recruited for this study. Of whom, 561 had participated in the study with a response rate of 94.7%. We excluded 8 cases from the data analysis because of poor cooperation and missed information. The remaining 553 subjects consisted of 287 males (51.9%) and 266 females (48.1%). The age of the students ranged from 6 to 12 years. Mean age  $\pm$  SD of the participants was 7.31  $\pm$  1.059 years, Table 1.

### Vision and VA

Uncorrected visual acuity of 6/9 or better in at least one eye was found in 362 out of 553 students (65.5%). The prevalence of visual impairment (UCVA of 6/12 or worse) in the better eye was 34.5% (191 of 553). The results of the vision screening according to gender and age of the participants are shown in Tables 1 and 2. Of the 34.5 per cent of this sample found to have UCVA of 6/12 or worse in the better eye, 32.2 per cent of them had refractive errors (178 of 553). The remaining 2.3 per cent (13 of 553) had UCVA of  $\leq 6/12$  due to other ocular causes, see Table 3.

**Table 1: Overall results of x/s/onscreening in schools of internally displaced students in //ag by gender.**

Gender	Screened students	Visual acuity 6/9 or better	Visual acuity 6/12 or worse
		Number (%)	Number (%)
Male	287 (51.9%)	173 (31.3%)	88 (16%)
Female	266 (48.1%)	189 (34.2%)	112 (20.2%)
Total	553 (100%)	362 (65.5%)	191 (34.5%)

**Table 2: Overall results of x/s/onscreening in schools of internally displaced students in map by age.**

Age group (years)	Visual acuity 6/9 or better	Visual acuity 6/12 or worse	Total
	Number (%)	Number (%)	Number (%)
6 -7	161 (29.1%)	64 (11.57%)	225 (40.7%)
7 -8	70 (12.7%)	45 (8.14%)	115 (20.8%)
8 -9	56 (10.1%)	30 (5.4%)	86 (15.6%)
9 -10	57 (10.3%)	28 (5.06%)	85 (15.4%)
10 -11	13 (2.4%)	18 (3.25%)	31 (5.6%)
11 - 12	5 (0.9%)	6 (1.08%)	11 (1.9%)
Total	362 (65.5%)	191 (34.5%)	553 (100%)

**Table 3. Causes of visual impairment in the internally displaced schoolchildren in Iraq.**

Causes	Number (%) of students with visual impairment
Refractive error	178 (32.2%)
Amblyopia	10 (1.8%)
Keratoconus	2 (0.3%)
Retinal disease	1 (0.2%)
Total	191 (34.5%)

### Refractive errors

The overall prevalence of refractive error in the better eye was 32.2% of the studied sample (n = 178), Table 3. Of those 178 students with RE, only 18 (3.3%) wore spectacles during the time of the examination, and this making the prevalence of uncorrected RE was 28.9% in the examined schoolchildren (160 of 553). Tables 4 and 5 are showing the prevalence of refractive error types distribution according to gender and age of the examined schoolchildren.

The overall prevalence of hyperopia was 13.9% (n = 77). Myopia was detected in only 3.8% of the studied sample (n = 21), and the prevalence of astigmatism was 14.5% (n = 80). In case of astigmatism, mixed astigmatism was the most prevalent type (6.7%) of the total studied cases, followed by compound hyperopic astigmatism (3.6%) and compound myopic astigmatism (2.4%), Table 6.

**Table 4: The prevalence of myopia, hyperopia and astigmatism by gender.**

Type of refractive error	Gender		Total Number (S)
	Male Number (%)	Female Number (%)	
Myopia	9 (1.6%)	12 (2.2%)	21 (3.8%)
Hyperopia	25 (4.5%)	52 (9.4%)	77 (13.9%)
Astigmatism	41 (7.4%)	39 (7.1%)	80 (14.5%)
Total	75 (13.5%)	103 (18.7%)	178 (32.2%)

**Table 5: The prevalence of myopia, hyperopia and astigmatism by age.**

Age (years)	Type of RE			Total Number (%)
	Myopia Number (%)	Hyperopia Number (%)	Astigmatism Number (%)	
6 – 7	1 (0.2%)	32 (5.7)	27 (4.9%)	60 (10.8%)
7 -8	5 (0.9%)	17 (3.1)	20 (3.6%)	42 (7.6%)
8 -9	2 (0.4%)	14 (2.5)	12 (2.2%)	28 (5.1%)
9 -10	5 (0.9%)	7 (1.3)	14 (2.5%)	26 (4.7%)
10 -11	5 (0.9%)	5 (0.9)	5 (0.9%)	15 (2.7%)
11 -12	3 (0.5%)	2 (0.4)	2 (0.4%)	7 (1.3%)
Total	21 (3.8%)	77 (13.9%)	80 (14.5%)	178 (32.2%)

**Table6: Type and distribution of astigmatism by gender.**

Type of astigmatism	Gender		Total Number (%)
	Male Number (%)	Female Number (%)	
Simple myopic astigmatism	5 (0.9%)	3 (0.5%)	8 (1.4%)
Simple hyperopic astigmatism	0	2 (0.4%)	2 (0.4%)
Compound myopic astigmatism	8 (1.4%)	5 (0.9%)	13 (2.4%)
Compound hyperopic astigmatism	9 (1.6%)	11 (2%)	20 (3.6%)
Mixed	16 (2.9%)	21 (3.8%)	37 (6.7%)
Total	41 (7.4%)	39 (7.1%)	80 (14.5%)

### DISCUSSION

This study was conducted to test the visual performance and estimate the prevalence of refractive errors in the internally displaced schoolchildren in Iraq.

In general, in this study, refractive errors were found in 32.2 per cent of the examined students. Results of refractive errors prevalence studies throughout the worlds vary widely. In Iraq, the prevalence of refractive errors among schoolchildren has been studied in a limited number of studies; in Amara city was (47%)<sup>1</sup>, in Thiqr governorate was (35%)<sup>1</sup>, in Erbil governorate was (25%)<sup>2</sup>, and in Massif Kurdistan

was (23.33%). In other studies around the world, refractive errors prevalence among children were; (26.67%) in Iran (18.6%) in Saudi Arabia, (22.1%) in Egypt<sup>13</sup>, (20.9%) in India<sup>14</sup>, (6.3%) in Ethiopia<sup>1</sup>, (12.8%) in China<sup>15\*</sup>, (46.8%) in Australia, and (79 %) in the Unites States<sup>11</sup>. This wide variation in the results could be explained by; the racial and genetic factors of the different countries<sup>118</sup>, the difference in the sampling methods and by the sample size. Also, the age range of the children is different in each study. While in our study it was (6 -12) years, other studies had older or younger age groups included.

Furthermore, 28.9 per cent of the internally displaced children with refractive errors were uncorrected, as only a small number of them wore corrective glasses. This can be explained by the fact that, as a result of the conflicts in their cities, many of these children never had a previous visual examination. Also, for those who had previously examined and prescribed spectacles, the low compliance for wearing glasses came from social stigma and financial causes.

In this study, astigmatism was found as the more prevalent type of refractive error (14.5%) followed by hyperopia (13.9%), while the prevalence of myopia was (3.8%) among the examined schoolchildren. An explanation to these results could be by the fact that the majority of the studied children were at younger age (mean age around 7 years). Also, the prevalence of astigmatism could be explained by the high prevalence of dry eye and allergic conjunctivitis among the Iraqis children<sup>1,2,3,4</sup>

In conclusion, uncorrected refractive error was found to be an important health problem among the internally displaced children in Iraq. Major actions need to be taken by performing regular school-screening programs that provide corrective glasses at low costs or free to those who need them.

## REFERENCES

- Mehari ZA. Prevalence of refractive errors among schoolchildren in rural central Ethiopia. *Clinical and Experimental Optometry*, 2013; 96: 65-69.
- Pascolini D, Mariotti SP. Global estimates of visual impairment. *British Journal of Ophthalmology*, 2012; 96(5): 614-8.
- Maul E, Barroso S, Munoz SR, Sperduto RD, Ellwein LB. Refractive Error Study in Children: Results from La Florida, Chile. *American Journal of Ophthalmology*, 2000; 129: 445-54.
- Gore FM, Bloem PJ, Patton GC, Ferguson J, Joseph V, Coffey C, et al. Global burden of disease in young people aged 10–24 years: a systematic analysis. *Lancet*, 2011; 377(9783): 2093-102.
- International Agency for the Prevention of Blindness. VISION 2020—the right to sight. London: International Agency for the Prevention of Blindness. [cited 2019 May 12]. Available from: <http://www.vision2020.org/main.cfm>.
- Pizzarello L, Abiose A, Ffych T, Duerksen R, Thulasiraj R, Taylor H, Faal H, et al. Vision 2020: the right to sight. A global initiative to eliminate avoidable blindness. *Archives of Ophthalmology*, 2004; 122: 615–620.
- UNICEF. Iraq Monthly Humanitarian Situation Report, March 2019. [cited 2019 Jun 20]. Available from: <https://reliefweb.int/report/irap/unicef-irap-monthly-humanitarian-situation-report-march-2019>.
- Mohammad HUH, Mirzajani A, Hassan HM, Hussein HA, Jafarzadehpur E. The Prevalence of Refractive Errors Among First Grade of Primary School in Amara, South of Iraq. *Function and Disability Journal*, 2018; 1(1): 25-31.
- Saadoon AA, Ja'az MH, ALMusaway SM. Refractive errors in Thiqr Secondary schooling graduate students: prevalence and determinants at 2016. *Al-Nasiriyah journal of medicine*, 2017; 32: 26-30.
- Ahmad M.A. The Prevalence of refractive errors among school children in Massif, Kurdistan, Iraq. Conference Paper, 2017; 1.
- Shakir Agha, N.F., Al-khayat, Z.A., Ahmad, M.A. & Alharmni, K.I. Prevalence of Refractive Errors and Microbiological Problems in The Primary Schools Around Urban of Erbil City (Bastora). *Kurdistan Journal of Applied Research*, 2018; 3(1): J - 14.
- Hashemi H, Yekta A, Jafarzadehpur, E, Ostadimoghaddam, H, et al. High Prevalence of Refractive Errors in 7 Years Old Children in Iran. *Iran Journal of Public Health*, 2016; 45(2): 194-202.
- Aldebasi, YH. Prevalence of Correctable Visual Impairment in Primary School Children in Qassim Province, Saudi Arabia. *Journal of Optometry*, 2014; 7: 168-176.
- Bayoumy B, Saad A, Choudhury A. Prevalence of refractive error and low vision among schoolchildren in Cairo. *Eastern Mediterranean Health Journal*, 2007; 3: 575–579.
- Prabha V, et al. A Cross Sectional Study on Refractive Error among School Children aged 6 to 17 Years in Chennai, India. *International Journal of Community Medicine and Public Health*, 2016; 3(1): 71-73.
- Zhao J, Pan X, Sui RF, Muñoz SR, Sperduto RD, Ellwein LB. Refractive error study in children: results from Shunyi District, China. *American Journal of Ophthalmology*, 2000; 129: 427–435.
- Junghans BM, Crewther SG. Little evidence for an epidemic of myopia in Australian primary school children over the last 30 years. *BMC Ophthalmology*, 2005; 5: 1.
- Hendler K, Mehravaran S, Lu X, Brown SI, Mondino BJ, Coleman AL. Refractive errors and amblyopia in the UCLA preschool vision program; first year results. *American Journal of Ophthalmology*, 2016; 172: 80-86.
- Hashemi H, Fotouhi A, Yekta A, Pakzad R, Ostadimoghaddam H, Khabazkhoob M. Global and regional estimates of prevalence of refractive errors: Systematic review and meta-analysis. *Journal of Current Ophthalmology*, 2018; 30: 3-22.
- Qasim KF, Shadad A. Prevalence of Refractive Errors in Patients with Keratoconus among Sample of Iraqi Population. *Journal of Ophthalmology*, 2017; 2(4): 1-8.