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Original Article

PREVALENCE OF ANISOMETROPIC AMBLYOPIA AMONGST SCHOOL CHILDREN IN SOHAG GOVERNMENT

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Abstract
***Purpose**: Amblyopia is the blurry vision which means a decrease in best-corrected visual acuity in one or both eyes due to the lack of binocular vision due to the neurological deficit in the visual system. It is more common in school children and could be a major problem leading to poor performance in education. In general, the rate of children having amblyopia is from 0.13% to 12.9 %. In this study, we aim to estimate its prevalence in school children in Sohag governorate by identifying the factors that cause risks. **Method**: In this cross-sectional study, 500 school age children in Sohag government were screened for the presence of anisometropic amblyopia and associated risk factors. **Results**: Amblyopia was prevalent amongst 6% of children (6-18 years old) in Sohag governorate. Anisometropic amblyopia was found in 3.2%. Only 2% of children had visual acuity in the better eye < 6/60, with amblyopia more prevalent in these children. High hyperopia appeared amongst 1.8% of subjects with amblyopia more prevalent in this type of error than in other types.*

Keywords: *Prevalence, Anisometropic amblyopia, School children, Sohag, Egypt*

1. Introduction (Prevalence of anisometropic amblyopia amongst school children in Sohag government)

Most ametropias are considered to be isometropia in which the refractive error of the two eyes is nearly similar [1]. However, some people have an interocular difference in refractive error, leading to anisometropic amblyopia. Other causes of amblyopia include visual stimulus deprivation as congenital cataracts and congenital infantile esotropia [2]. Amblyopia is the blurry vision which means a decrease in best-corrected visual acuity in one or both eyes due to the lack of binocular vision due to neurological deficit in the visual system. electrodiagnosis could be used as amesuring tool [3]. It is more common in school children and could be a major problem leading to poor performance in education [4]. In general, the rate of children having amblyopia is from 0.13% to 12.9 % [5,6]. Screening and early detection will lead normal vision to being restored [7]. Treatment includes spectacle

correction as first line, occlusion and/or penalization of the better-seeing eye to force the patient to use the amblyopic eye after refractive correction of visual impairment in the affected eyes with eyeglasses [8]. One of the major complications that amblyopia causes to the eye is blindness [9]. In this study, we aim to estimate its prevalence in school children in Sohag governorate by identifying the factors that cause risks.

2. Patients and methods

2.1. *Ethical consideration*

The research was carried out in Sohag government from 15 February to 15 May 2023. Full ethical considerations were followed. The subjects or legal representatives (guardians) provided written informed consent. The investigations were done freely to the patients. Ethical approval was taken from the Medical Research Ethics Committee (Sohag University). IRB: soh-med-23-01-26.The study was done under Helsinki declaration principles. An informed written comprehensive consent was taken from each patient.

2.2. *Study population*

In this cross-sectional study, 500 school age children in Sohag government were screened for the presence of anisometropic amblyopia and associated risk factors. *Inclusion criteria*: School children <18 years old. *Exclusion criteria*: Amblyopia other than anisometropic one. Students in Sohag government schools under 18 years were included and examined for: ***)** Visual acuity. ***)** Refractive errors. ***)** Fundus examination. ***)** Presence of amblyopia. ***)** Degree of refractive error. ***)** Low degree/ no refractive error. ***)** Moderate myopia (-2.0 to -4.0 D). ***)** High myopia (< -4.0 D). ***)** Moderate hyperopia (+2.0 to +5.0 D). ***)** High hyperopia (> +5.0 D). Permission was taken from the responsible authority before the study.

2.3. *Statistical analysis*

Analyzing the collected data was carried out using STATA v. 14.2 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP.). Standard deviation and mean were used to represent the quantitative data. Moreover, ANOVA with Bonferroni post-hoc test was utilized to compare the means of the 4 groups. Percentages and numbers were adopted to represent the qualitative data, and comparisons were made using the Chi-square test. Significant value was set to $P < 0.05$. Additionally, STATA was used to produce graphs.

2.4. *Sample size*

The sample size was estimated by Epi Info 7 according to this assumption: the proportion of true knowledge of 50%, level of confidence interval of 95% and precision 5%, and design effect 1 to be 384 that is the minimal sample size.

3. Results

Amblyopia was prevalent amongst 6% of children (6-18 years old) in Sohag governorate. Anisometropic amblyopia was found in 3.2%. Only 2% of children had visual acuity in the better eye < 6/60, with amblyopia more prevalent in these children. High hyperopia appeared amongst 1.8% of subjects with amblyopia more prevalent in this type of error than in other types, tab_s. (1 & 2).

Table 1: Demographic data

	Frequency(n)	Percentage%
Age		
▪ 6-8	149	29.8
▪ 9-11	126	25.2
▪ 12-14	118	23.6
▪ 15-18	107	21.4
Sex		
▪ Males	286	57.2
▪ Females	214	42.8
History of spectacle use	53	10.6

Table 2: Refractive errors and visual acuity of the patients

	Frequency (n)	Percentage %	Amblyopia (n)	Odds ratio (95% CI)
Refractive esotropia	6	1.2	2	1
Anisometropia				
▪ No anisometropia	441	88.2	12	1
▪ Anisometropia <1D	18	3.6	3	4.21 (0.98-9.10)*
▪ Anisometropia ≥1D to <2D	21	4.2	7	7.95 (3.21-15.58)**
▪ Anisometropia ≥2D	20	4	6	11.05 (5.36-20.69)***
Presentation of the distance visual acuity of the better eye				
▪ Better than 6/18	454	90.8	11	1
▪ ≤6/18 to ≥6/60	36	7.2	11	12.68 (5.96-30.25)***
▪ <6/60 to ≥3/60	6	1.2	5	21.98 (11.57-39.15)***
▪ <3/60	4	0.8	3	38.03 (20.68-70.94)***
Degree of refractive error				
▪ Low degree/ no refractive error	435	87	19	1
▪ Moderate myopia (-2.0 to -4.0 D)	25	5	2	1.22 (0.59-5.29)
▪ High myopia (< -4.0 D)	20	4	1	2.98 (0.98-7.69)
▪ Moderate hyperopia (+2.0 to +5.0 D)	11	2.2	4	10.23 (5.98-21.98)***
▪ High hyperopia (> +5.0 D)	9	1.8	4	25.36 (10.38-69.28)***

***Notice**: *p<0.05, **p<0.01, ***p<0.001*

4. Discussion

In line with previous studies [10,11] 6% of the study participants had amblyopia, and anisometropic amblyopia was found in 3.2%. The similarities could be due to similarities in the sociodemographic factors. Though, this research had better results than those reported by other research papers in Eastern Europe [12], Saudi Arabia [4], and Minia, Egypt [13], which reported 1.49%, 2.8%, and 2.5%, respectively. For instance, there were differences between the present study and the one conducted in Minia because it was limited to children aged 7-9. Because aging enhances the potential amblyopic, the findings of the present research were higher as it included older students up to the age of 18 years. Additionally, there were differences between the present study and the one conducted in Eastern Europe and Saudi Arabia, probably because of the various sociodemographic properties of the subjects. The study achieved lower results than those obtained by other research papers in Nigeria [14], Ethiopia [15], and Saudi Arabia [14], as they achieved 12.9%, 9.1%, and 9.5%, respectively. All these studies were carried out in hospitals, and the subjects suffered from eye complaints. Therefore, the findings of the study were expected to be less than the findi-ngs reported in other studies. In the present study, the odds of being amblyopic amongst participants with anisometropia of less than 1D and rated 4 times (95% CI: 0.98-9.10) higher than those with no anisometropia, and the odds of being amblyopic among school age children with anisometropia were higher between 1 and 2D and rated 7.95 times (95% CI: 3.21-15.58)

more than those with no anisometropia. This result agrees with the findings reported in China and Ethiopia [17-19]. The agreement between the present study and the literature [18,19] might result from the similarities in the study setting that were conducted in community-based settings. The present study and another carried out in China [17] adopted comparable technical procedures in the examination and diagnosis of amblyopia, which might result in similar findings. The study reported that the odds of being amblyopic among the subjects with anisometropia of more than 2D were about 11 times (CI: 5.36-20.69) in comparison with those with no anisometropia. There is an agreement between the present result and those reported in previous studies [18,19], which could be due to similarities in the design and setting. Additionally, this result was proven by another study that included a sample of Australian children aged six [20]. The research revealed that the odds of being amblyopic among the subjects with a refractive error of > +5D hypermetropia scored 25.36 times (95% CI: 10.38-69.28) higher than the subjects with no/mild refractive error. This result agrees with the literature [18,19], which could be because of the study setting. Both studies were carried out in a community setting, unlike others conducted in school settings, which could cause comparable results. The odds of being amblyopic amongst subjects having a refractive error between +2 and +5D hypermetropia were about 10.23 times (95% CI: 5.98-21.98) higher than the subjects having no/mild refractive error. This community-based study agrees with other community-based ones conducted in Australia [21], China [18], and Ethiopia [19]. The similarities in the research designs could cause similar findings.

5. Conclusion

Early detection of amblyopia amongst school children is the key for restoration of normal or near normal vision; good screening system is required in rural and urban areas. The social circumstances with the availability of medical care services play crucial role

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