

Original Article

THE PREVALENCE OF STRABISMUS IN CHILDREN AT SCHOOL AGE IN SOHAG CITY

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Abstract

Objective: The aim of the study is to determine the prevalence of different types of strabismus in primary school children; grade one in Sohag city. **Background:** Strabismus is the most common amblyogenic factor. Children with untreated strabismus and/or amblyopia will lack the ability to fully develop binocular single vision. They may have psychosocial difficulties later in life. **Design:** A cross sectional study was employed to determine the prevalence of strabismus among primary school children (grade one) in Sohag city from November 2017 to April 2018. **Methods:** Visual acuity, autorefraction, Hirschberg's test and cover test using a pen light torch were performed for 584 out of 841 students (age range 5.5–7 years). Children with any type of strabismus or had a history of strabismus surgery were subjected to a full ophthalmic examination including slit lamp, extraocular muscles examination, Worth 4 dots test, and fundus examination. **Results:** Students with strabismus are 8 of 584 students. Four of them are boys and the others are girls. Three of the detected cases are esotropias (two boys and one girl) with a prevalence of 0.5%. The other five detected cases are distributed as three cases of exophorias (two girls and one boy) with a prevalence of 0.5% and two cases of esophorias (one girl and one boy) with a prevalence of 0.3%. In the present study, 506 students (255 males and 251 females) are emmetropic ($< \pm 1.00 D$) with a percentage of 86.6% and the other 78 students (40 males and 38 females) are with refractive errors with a percentage of 13.4%. Most of them are with astigmatism (9.3%) then myopia (2.9%) and hypermetropia (1.2%). **Conclusion:** In this study, the prevalence of strabismus in children at school age in Sohag city is 1.4% with no statistically significant association with gender.

Keywords: Children, Prevalence, Sohag, Strabismus.

1. Introduction

At the time of school entry, children frequently have undetected visual problems. When vision is suboptimal, it often leads to

poor school performance with consequent lack of interest and frequent drop-out from school. Underlying visual problems often

manifest as behavioral problems, e.g. learning disabilities, impaired reading performance and attention deficit disorder. The World Health Organization (WHO) included uncorrected refractive errors among the leading causes of blindness and vision impairment worldwide and the most important /significant risk factor for the development of amblyopia [1]. VISION 2020, the global initiative of WHO through the International Agency for the Prevention of Blindness for the elimination of avoidable blindness, recommends the control of refractive errors as a priority for national eye programs. Simple visual acuity (VA) test is suggested to be included into school health programs with provision of spectacles to all children with significant refractive errors [2]. Strabismus is defined as a misalignment of one eye in relation to the other, resulting in failure of the two eyes to simultaneously focus on the same image and loss of binocular vision. Strabismus affects 2% to 5% of the

2. Study Design

A cross sectional study was employed to determine the prevalence of strabismus among primary school children (grade one)

Inclusion criteria, included children at school age in Sohag city; primary school grade one with ages between 5.5 to 7 years.

2.1. Study area and population

Sohag Governorate is located in Upper Egypt and has a total area of 11022 km² and inhabited area of 1547 km² with an estimated about 5 million inhabitants. The governorate consists of 12 districts. Sohag city has been the capital since 1960. It is about 470 Km from Cairo; the Capital of Egypt. It contains of 11 public governmental primary schools and 5 private primary schools. In the

2.2. Methods

For all children, the following examination was done: **1)** Testing uncorrected monocular distance visual acuity using Landolt C chart. **2)** Testing corrected visual acuity (students with glasses). **3)** Non cycloplegic auto

refraction by autorefractometer. **4)** Rough estimation of a deviation by Hirschberg's test and cover test using a torch pen light. **5)** A cycloplegic autorefraction in children with defective vision (VA < 6/9), children with population and can result in amblyopia, which is often not discovered in time to initiate effective treatment [3-5]. The most common amblyogenic strabismus and approximately 40% of children with manifest strabismus have amblyopia. Children with untreated strabismus and/or amblyopia will lack the ability to fully develop binocular single vision. Later in life, they may have psychosocial difficulties and this may preclude such individual from particular occupations [6]. The prevalence of strabismus is usually under estimated, often due to lack of awareness and data especially in Sohag. Poverty and illiteracy play a major role in preventing peoples from seeking medical advice and some traditions prevent parents from seeking treatment for strabismus or allowing their children, especially females, to wear glasses to correct refractive errors.

in Sohag city from November 2017 to April 2018.

present study, we randomly selected 5 public primary schools with a total of 677 grade one students (331 boys and 346 girls) and one private primary school with a total of 164 grade one students (98 boys and 66 girls). 584 out of 841 students were examined (295 boys and 289 girls). There were 186 absent and 3 afraid students and 86 students whose parents refused the examination.

refraction by autorefractometer. **4)** Rough estimation of a deviation by Hirschberg's test and cover test using a torch pen light. **5)** A cycloplegic autorefraction in children with defective vision (VA < 6/9), children with

squinting eyes and uncooperative children, after instillation of cyclopentolate 1% eye drops for at least 2 hours. Children with any type of strabismus or had a history of strabismus surgery were subjected for the following:

* Full history taking from their parents by answering of a questionnaire to obtain the following data; age, sex, developmental history, history of spectacle correction, occlusion or penalization therapy, history of previous ocular surgery or trauma and family history.

2.3. Ethical considerations

The study was conducted after permission of Sohag Educational Administration and Ministry of Education. Approval was also granted by the Scientific Ethics Committee of the Faculty of Medicine, Sohag University.

3. Results

In the present study, we included 5 public governmental schools with a total of 677 first year students (No. of examined students =498; 73.6%) and one private school of a total of 164 first year students (No. of examined students =86; 52.4%), tab. (1). The students who couldn't be examined (total No. of them 257 with a percentage of 30.6%) were distributed as afraid or absent students or their parents refused the examination, tab. (2). The students, who have any type of strabismus, are 8 of 584 students. Four of them are boys and the others are girls, tab. (3). Three of the detected cases are esotropia (two boys and one girl) with a prevalence of 0.5%:

*) One boy has left anisometropic esotropia $\pm 30^\circ$ with amblyopia due to left moderate macular dysfunction according to ERG. UCVA is 6/36 which is best corrected to 6/6 by (-2.25, -2.25/15°) in OD. But, in OS, UCVA is <3/60 and best corrected to 6/60 by (-11.25, -2.00/163°).

- * Anterior segment examination using slit lamp.
- * Ocular alignment examination by Hirschberg's test and cover test.
- * Extraocular muscles examination including eye movements and signs of previous ocular surgery or trauma.
- * Testing of UCVA and BCVA.
- * Worth four dots examination for binocular vision.
- * Fundus examination using direct ophthalmoscope.
- * Awareness of parents about the diseases and how to deal with them.

All schools involved in the survey together with their local authorities were informed of the study beforehand. Also, informed consent was taken from the parents of all participant children.

- *) Another boy has alternative esotropia $\pm 30^\circ$ with no refractive errors. Unaided Visual Acuity in OD is 6/6 and in OS is 6/6.
- *) One girl has right esotropia $\pm 45^\circ$ and partially corrected to $\pm 15^\circ$ after correcting the refractive errors. In OD, UCVA is 6/24 and best corrected to 6/9 by (+5.50, -1.25/12°). Also, in OS, UCVA is 6/18 and best corrected to 6/6 by (+5.75, -1.50/175°).

The other five detected cases are distributed as three cases of exophoria (two girls and one boy) with a prevalence of 0.5% and two cases of esophoria (one girl and one boy) with a prevalence of 0.3%. In the present study, 506 students (255 males and 251 females) are emmetropic ($< \pm 1.00$ D) with a percentage of 86.6 % and the other 78 students (40 males and 38 females) are with refractive errors with a percentage of 13.4%. Most of them are with astigmatism (9.3%) then myopia (2.9 %) and hypermetropia (1.2%), tab. (4), figs. (1 & 2). In the present study, only 17

students were known that they are ametropic and the spec-tacles were prescribed to them before and they wear glasses before school

entrance and 61 students are not known to be that, tab. (5).

Table (1) Examined students

School Name	Total Grade One	Total Examined	%
Al Etehad	27	25	92.6
Al Ahd	45	37	82.2
Naser	43	31	72.1
Bahethat Al Badia	314	230	73.3
Taha Hussein	248	175	70.6
Al Zohor	164	86	52.4
Total	841	584	69.4

Table (2) Missed data

School Name	Total Grade One	Absent Students	%	Afraid Students	%	Parental Refusal	%
Al Etehad	27	2	7.4	0	0.0	0	0.0
Al Ahd	45	8	17.8	0	0.0	0	0.0
Naser	43	11	25.6	0	0.0	1	2.3
Bahethat Al Badia	314	82	26.1	2	0.6	0	0.0
Taha Hussein	248	73	29.4	0	0.0	0	0.0
Al Zohor	164	10	6.1	1	0.6	67	40.9
Total	841	186	22.1	3	0.4	68	8.1

Table (3) Squint cases

School Name	Total Examined	Total Squint	%	Examined M.	Squint M.	%	Examined F.	Squint F.	%
Al Etehad	25	0	0.0	13	0	0.0	12	0	0.0
Al Ahd	37	1	2.7	15	1	6.7	22	0	0.0
Naser	31	1	3.2	13	0	0.0	18	1	5.6
Bahethat Al Badia	230	3	1.3	114	2	1.7	116	1	0.9
Taha Hussein	175	3	1.7	91	1	1.1	84	2	2.4
Al Zohor	86	0	0.0	49	0	0.0	37	0	0.0
Total	584	8	1.4	295	4	1.4	289	4	1.4

Table (4) Refractive state

School Name	Examined	Emmetropia	%	Myopia	%	Hyperopia	%	Astigmatism	%
Al Etehad	25	22	88.0	0	0.0	0	0.0	3	12.0
Al Ahd	37	31	83.8	1	2.7	1	2.7	4	10.8
Naser	31	24	77.4	0	0.0	1	3.2	6	19.4
Bahethat Al Badia	230	198	86.1	10	4.4	1	0.4	21	9.1
Taha Hussein	175	156	89.1	4	2.3	3	1.7	12	6.9
Al Zohor	86	75	87.2	2	2.3	1	1.2	8	9.3
Total	584	506	86.6	17	2.9	7	1.2	54	9.3

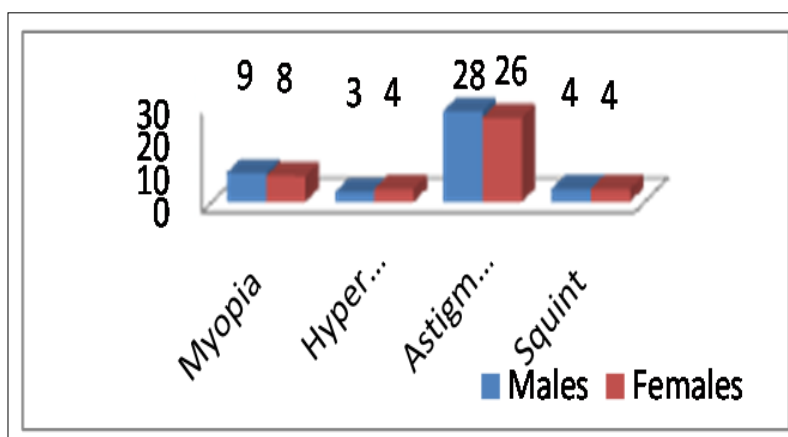


Figure (1) Column chart shows numbers of male and female students with refractive error and squint.

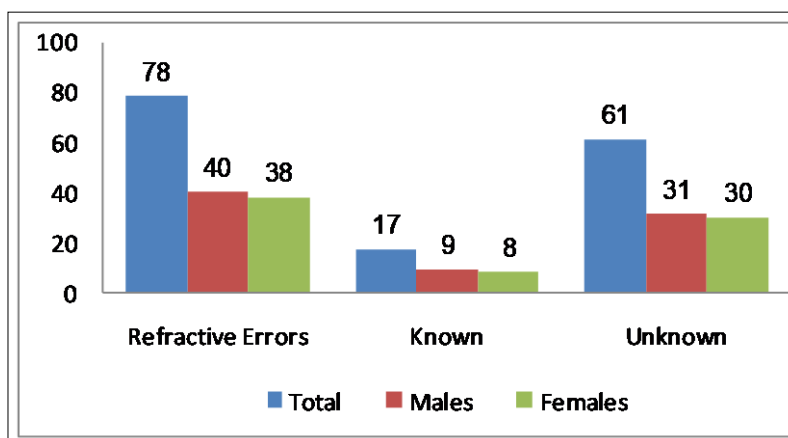


Figure (2) Column chart shows numbers of students with known and unknown refractive error and their gender.

Table (5) Known and unknown refractive errors

School Name	Examined	Known	%	Unknown	%
Al Etehad	25	1	4.0	2	8.0
Al Ahd	37	0	0.0	6	16.2
Naser	31	2	6.5	5	16.1
Bahethat Al Badia	230	8	3.5	24	10.4
Taha Hussein	175	2	1.1	17	9.7
Al Zohor	86	4	4.7	7	8.1
Total	584	17	2.9	61	10.5

4. Discussion

Strabismus is a common ocular disorder in children; the prevalence of strabismus ranges from 0.8% to 5.65%. Decreased binocularity and amblyopia can be resulted from untreated significant strabismus, and could eventually lead to psychosocial problems, including low

self-confidence, reduced inter-personal relationships depressive mood disorder, and reduced employment [7]. Early detection of refractive error during childhood is critical to avoid the hazardous consequences. Despite this, the rates of vision screening among

school-aged children remain relatively low over the past decades, partially because of the controversy over the effectiveness of screening techniques as compared with examinations dependent on symptoms, and the unclear relationship between undiagnosed vision impairment and academic performance [8]. Although the early detection of undiagnosed visual problems has gained much attention recently, only few studies have examined the prevalence of common visual problems in schoolchildren at the time of school entry. Therefore, we conducted the present cross-sectional study in order to determine the prevalence of different types of strabismus in primary school children; grade one in Sohag city. The secondary outcome was to detect the prevalence of undetected error of refraction. In the present study, we included 5 public governmental primary schools and one private school. In order to investigate the effect of socioeconomic status on the prevalence of strabismus and undetected refractory errors, we categorized public schools' students as low socioeconomic class and private school's students as high socioeconomic class. With regard to our primary outcomes, only eight students (1.4% of the total students) had strabismus. The distribution of strabismus is equal according to gender (4

males and 4 females). The prevalence of esotropia, esophoria and exophoria is 0.5%, 0.3% and 0.5% respectively. No exotropia is detected with regard to secondary outcomes of the present study; the prevalence of undiagnosed refractive errors was 10.5%, while the prevalence of diagnosed errors was 2.9% only. The most common causes of refractory error in the present study were astigmatism (9.3 %), followed by myopia (2.9 %) and hypermetropia (1.2 %). Notably, the proportion of children undiagnosed refractory errors was significantly higher in public governmental schools than private schools. This significant difference in the prevalence of undiagnosed refractory errors between public governmental schools and private schools can be explained the difference in socioeconomic status. It was previously reported that lower socioeconomic status can predict under corrected refractive error, where higher prevalence of under corrected refractive error was found in those in receipt of a government pension and in those with lower educational attainment. Taken together, these findings suggest that both perceived costs of attending an eye care practitioner and lack of knowledge of the potential benefits from refractive correction might inhibit many people from seeking assistance [9].

5. Conclusion

In conclusion, the prevalence of strabismus in children at school age in Sohag city is 1.4% with no statistically significant association with gender. The prevalence of esotropia, esophoria and exophoria is 0.5%, 0.3% and 0.5% respectively. No exotropia was detected. Approximately, 13.4% of children had refractive errors. Astigmatism is the most common type (9.3%), then myopia (2.9%) and lastly hypermetropia (1.2%). In addition, the prevalence of undiagnosed refractive errors is 10.5% while the prevalence of diagnosed errors is 2.9% only. We acknowledge that the present study has number of limitations. The study was descriptive of nature with no follow-up which might have introduced performance and detection bias. Moreover, the sample size was relatively small which may affect the generalizability of our findings. So, we need more researches and need to widen the area included. Also we can redo this study on the same sample after 5 years to ensure the percentage and to study the association between diagnosis of refractive errors and the academic performance. Vision screening of school and preschool children in developing countries could be useful in detecting correctable causes of decreased vision, especially refractive errors, and in minimizing long term permanent visual disability. So, proper ophthalmological screening should be carried out, including extraocular examination, fundus examination, and visual acuity testing, with special emphasis on detection of errors of refraction. Also extensive health education campaigns among children as well as their parents are needed.

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