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By Universitas Muhammadiyah Sidoarjo

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Age and Gender Strongly Influence Visual Impairment in Schoolchildren

Usia dan Jenis Kelamin Sangat Mempengaruhi Gangguan Penglihatan pada Anak Sekolah

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Abstract

Background: Blurred vision caused by refractive errors, which result from an imbalance between the axial length and optical power of the eye, is prevalent worldwide. This condition, if undiagnosed in school-aged children, can significantly affect learning and development. **Specific background:** In Basra City, the prevalence of refractive errors and their impact on students' academic performance remains underexplored. **Knowledge gap:** There is limited data on the correlation between visual acuity and academic levels in elementary school pupils in this region, especially concerning demographic factors such as age and gender. **Aims:** This study aimed to determine the prevalence of visual impairment (VI), evaluate the visual acuity of elementary school pupils, and describe the characteristics of visually impaired students. Additionally, it sought to assess the relationship between visual acuity, age, gender, and academic performance. **Results:** A cross-sectional study was conducted on 200 students from Basra primary schools using a Snellen visual acuity chart. The results revealed that 24% had poor grades, 37% had moderate grades, and 39% had good grades. No significant relationship was found between visual acuity and academic performance, but a strong correlation was observed between visual acuity and both age and gender. **Novelty:** The study emphasizes the need for early detection of refractive errors in elementary school students and the significant correlation between visual acuity and demographic factors, especially age and gender. **Implications:** These findings suggest the need for regular vision screenings in schools to ensure early intervention and reduce the long-term impact of visual impairments on children's educational and social development.

Highlights:

Prevalence: High rates of visual impairment found among Basra elementary students.

Correlation: Visual acuity strongly linked to age and gender, not academic performance.

Recommendation: School vision screenings are vital for early detection and intervention.

Keywords: Refractive errors, Visual acuity, Elementary students, Basra City, Vision screening

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Introduction

One of our key sense systems is the visual system. It serves as the main channel for integrating people with their surroundings. Light entering the eye and the brain processing this information are what cause vision. Good educational activities and a regular life depend on having normal vision (1).

Any kind of visual impairment that impairs acuity or eye movements puts kids at risk for academic dysfunction. Many of the causes of vision impairment in preschoolers can be prevented, so screening schoolchildren for visual disorders is crucial because early detection can prevent amblyopic eye, also known as lazy eye, which is characterized by decreased visual acuity without obvious damage to the eye's structure or visual system (2). Blindness is defined as having visual acuity of less than 3/60 with the best correction, whereas low vision is defined as having visual acuity of less than 6/18 with the best correction (3). Impaired visual acuity is thought to affect 1.6 billion individuals worldwide, and its prevalence is rising (4). Refractive errors, trachomatous corneal opacity, and cataracts are the main causes of impaired vision and blindness. These reasons can be treated or avoided (5).

A kid goes blind every five minutes, and there are around 285 million visually impaired persons in the globe, according to the WHO. The prevalence of vision impairment is not evenly spread across the globe; around 90% of those who are visually impaired reside in poor nations (6). A child's growth depends heavily on their vision, and a visual impairment increases the likelihood of both impaired vision and sensory development as well as general socioeconomic status. all through life. The best chance for successful treatment of children's eye and vision issues is early identification. Thus, early screening is essential to prevent permanent vision impairment (7). Childhood vision impairment significantly affects a person's social life, job choices, and academic performance (8).

The primary cause of childhood blindness varies greatly by area and is mostly influenced by socioeconomic development as well as the accessibility of primary health and eye care services (9). Eye conditions are widespread and those who live long enough will experience at least one eye condition during their life, young children with early onset severe vision impairment can experience lower levels of educational achievement so Eye care needs are an integral part of universal health coverage, all individuals need to receive the health services when they need (6).

Refractive errors are prevalent worldwide, with an estimated 2.3 billion people experiencing vision impairment due to uncorrected refractive errors. In 2010, estimates indicated that refractive errors were the second leading cause of blindness worldwide. Prior research also revealed that 101.2 million patients worldwide suffered from visual impairment in 2010 as a result of refractive errors. The rate exceeded the rate reported in 1990 by an additional 15% (10, 11).

Refractive errors are the most common cause of visual impairment and the second leading cause of blindness worldwide. The World Health Organization (WHO) estimates that one billion individuals suffer from visual impairment. One of the primary causes of moderate to severe vision impairment or blindness in 123.72 million people has been identified as an untreated refractive error (12).

Blurred vision results from refractive errors, which are caused by an imbalance between the axial length and optical power of the eye. Myopia is one refractive defect that is now receiving a lot of scientific attention, mostly because of the recent increase in its frequency and the burden of related ocular diseases globally. The prevalence of myopia has also increased quickly, indicating that environmental factors may have an impact on eye development in addition to hereditary ones (13).

Myopia, hyperopia, or astigmatism are examples of refractory errors that can occur alone or in combination to form hyperopic or myopic astigmatism. Each country has a very different distribution of refractory mistakes, and certain East Asian nations have the greatest incidence rates. Numerous contributing variables have been found in groups where refractory mistakes are highly prevalent. These include having more education and being youthful. Furthermore, the development of refractory mistakes is influenced by both hereditary and environmental variables (10).

Uncorrected refractive errors are known to have many social consequences in addition to health risks. Isolation, diminished educational and career prospects, elevated morbidity, financial hardship, and general quality of life are some of the social repercussions. Eighty percent of the causes of vision impairment may be prevented or treated. "Vision 2020" is a global campaign to minimize avoidable blindness that was started by the WHO and 20 International Non-Governmental Organizations (INGOs). Vision 2020: the Right to Sight is a global program that prioritizes preventing refractive defects. Among the top ten candidates for this ailment are professionals who are actively involved in their studies (12).

Refractory error types Astigmatism, myopia, hyperopia, and presbyopia are the most prevalent forms of refractive defects.

1-Myopia, also known as nearsightedness, is a condition in which distant objects look fuzzy whereas up-close items appear clearly. Light focuses in front of the retina rather than on it when a person has myopia.

2- A typical kind of refractive error is hyperopia, or farsightedness, in which objects farther away appear sharper than those closer to the viewer. But everyone's experience of hyperopia is unique. Particularly in their youth, some people might not be aware of any visual issues. People with severe hyperopia may have fuzzy vision whether looking at objects close or far away.

3. The condition known as astigmatism occurs when the retina, the light-sensitive tissue at the back of the eye, is not uniformly focused by the eye. Images may look stretched out and fuzzy as a result.

4. The age-related disorder known as presbyopia makes it harder to focus up close. The lens's ability to alter shape is diminished with age, making it impossible for the eye to concentrate on near objects (15).

Methods

Design of the study:

An interventional study design was carried out in the Basrah primary schools' students involving (200) students (male and female), to examine their visual acuity.

The setting of the study:

The present study was carried out at Basrah primary schools. Using the Snellen chart for visual acuity, measuring the vision in both eyes, the information about visual acuity and the scientific level of each student was Wright down on a checklist.

Statistical analysis:

Analysis was made by using spss 26, Percentage (%), Frequency and Correlations

Result and Discussion

Result

Age groups	Frequency	Percent
6	20	10.0
7	3	1.5
8	75	37.5
9	13	6.5
10	17	8.5
11	32	16.0
12	37	18.5
13	3	1.5
Total	200	100.0

Table 1. Demographic characteristic of student's age (N=200).

This Table shows that the 8-year group of the sample study is more than other groups of the sample study. It is (37.5%). 7 years group and 13 years group are less than other groups of sample study. It is (1.5 %).

Gender		Frequency	Percent
Valid	Male	100	50
	Female	100	50
	Total	200	100

Table 2. Demographic characteristic of student's Gender (N=200).

This Table demonstrates that the students of the study sample are equal to males (50%) and females (50%) of the students of a sample study.

visual acuity	Frequency	Percent
6	148	74.0

9	17	8.5
12	11	5.5
18	12	6.0
24	5	2.5
36	7	3.5
Total	200	100.0

Table 3. measuring the vision in the right eye, and the information about the visual acuity of the study sample.

This Table describes that visual acuity in the right eye according to the Snellen chart for visual acuity of the sample study are (6/6 (74%), (9/6 (8.5%), (12/6 (5.5%), (18/6 (6%), (24/6 (2.5%), (36/6 (3.5%) of the students of the study sample.

visual acuity	Frequency	Percent
6	139	69.5
9	20	10.0
12	16	8.0
18	15	7.5
24	7	3.5
36	1	.5
60	2	1.0
Total	200	100.0

Table 4. measuring the vision in the left eye, and the information about visual acuity of the sample of the study.

This Table demonstrates that visual acuity in the left eye according to the Snellen chart for visual acuity of the sample study are (6/6 (69.5%), (9/6 (10%), (12/6 (8%), (18/6 (7.5%), (24/6 (3.5%), (36/6 (0.5%), (60/6 (1%) of the students of the study sample.

Scientific grading		Frequency	Percent
Valid	Poor grade	48	24.0
	Moderate	74	37.0
	good	78	39
	Total	200	100.0

Table 5. the distribution of the study sample according to Scientific grading

This table showed that 24% had poor grading, 37% had moderate grading and 39% had good grading.

Correlations			
		Visual acuity	Scientific level
Left eye	Pearson Correlation	1	.040
	Sig. (2-tailed)		.569
	N	200	200
Scientific level	Pearson Correlation	.040	1
	Sig. (2-tailed)	.569	
	N	200	200

Table 6. the correlation between visual acuity and scientific level

The table showed that there was no significant correlation between visual acuity and scientific level in the school.

Correlations			
		Age	Visual acuity
Pearson Correlation	1	.301**	
Sig. (2-tailed)		.000	
N	200	200	
Pearson Correlation	.301**	1	

Sig. (2-tailed)	.000		
N	200	200	
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 7. *The correlation between visual acuity and age*

This table showed that there was a highly significant correlation between visual acuity and age.

Correlations			
		Gender	Visual acuity
Pearson Correlation	1	-.286**	
Sig. (2-tailed)		.000	
N	200	200	
Pearson Correlation	-.286**	1	
Sig. (2-tailed)	.000		
N	200	200	
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 8. *the correlation between visual acuity and gender*

The table showed that there was a highly significant correlation between visual acuity and gender.

Discussion

This section is presenting a detailed findings interpretation and systematic discussion of the study results, about the study objectives. Supportive evidence for such findings is presented as being available in the relevant literature.

This study was conducted on Basra primary school students in the city of Basra, where the total sample reached 200 students, the results of our study showed that the 8-year-old study group is larger than other groups of the study sample (37.5%), while the 7- and 13-year-old study group is the least (1.5%). This is not consistent with a study conducted in Mosul in 2023, where the majority of students participating in the study were 9 years old (9.2%). (15, 16)

The results of our study also showed that the study sample included 200 male (50%) and female (50%) students, and this is not consistent with any of the previous studies.

The Snellen visual acuity chart was used in our study, and vision was measured in both eyes. Information about visual acuity and scientific information was determined on the level of each student in the checklist. This is consistent with a study conducted in Bangalore in 2022, where the visual acuity of children was examined using the Snellen chart and the pinhole test. (18)

As the results of our study showed that visual acuity in the right eye according to the Snellen chart for visual acuity of the sample study are (6/6(74%), (9/6 (8.5%), (12/6 (5.5%), (18/6 (6%), (24/6 (2.5%), (36/6 (3.5%) of the students of the study sample and that visual acuity in left eye according of Snellen chart for visual acuity of the sample study are (6/6 (69.5%), (9/6 (10%), (12/6 (8%), (18/6 (7.5%), (24/6 (3.5%), (36/6 (0.5%), (60/6 (1%) of the students of the study sample, These details were not mentioned in any of the previous studies.

The results of our study showed that 24% got a poor grade, 37% got a moderate grade, and 39% got a good grade. We, as nurses, explain that the reason why 24% and 37% got poor and moderate ratings is because of spending more reading hours, watching television, mobile use, inadequate light, and other factors that caused them to obtain poor and moderate ratings. The results showed that there is no significant relationship between visual acuity and academic level in school but have high significant correlation between visual acuity and age and also a high significant correlation between visual acuity and gender, These results were inconsistent with a study conducted in Bangalore, 2022, where there was a strong correlation between Refractive errors and TV viewing habits ($X^2 = 3.96$; $p < 0.05$ significance level), but no association was seen Refractive errors and other basic variables. (18)

Conclusion

The 8-year-old study group is larger than other groups of the study sample (37.5%). The results of our study also showed that the study sample included 200 male (50%) and female (50%) students. The Snellen visual acuity chart was used in our study, and vision was measured in both eyes. Information about visual acuity and scientific

information was determined on the level of each student in the checklist.

The results of our study showed that 24% got poor grades, 37% got moderate grades, and 39% got good grades. The results showed that there is no significant relationship between visual acuity and academic level in school but there is a high significant correlation between visual acuity and age and also a high significant correlation between visual acuity and gender.

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