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Prevalence of Amblyopia in Hawler Eye Teaching Hospital

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Abstract

Background and objectives: Amblyopia is defined as impairment of vision in the absence of ocular pathology that could be unilateral the most common or bilateral less common.
This study aimed to settle the prevalence and causes of amblyopia in Hawler Eye Teaching Hospital in Erbil City, Iraq. For the age between 6-12 years.

Methods: A cross-sectional study of 300 students are included in this study, in Hawler Eye Teaching Hospital from the 1st of October 2022 to 1st of April 2023. History and Clinical examination of anterior and posterior segment for all children are done. Autorefraction and visual acuity with E-letter LED smart visual system with monocular unaided trial and then aided trial for best corrected visual acuity children with less than 6/6 cyclopentolate eye drop 1% used for cycloplegic refraction.

Results: The prevalence of amblyopia was (25.3%) of the total sample (n=300). The most prevalent causes of amblyopia were refractive error (96.05%), and strabismus (23.7%). Males were more affected by amblyopia with (60.53%) while females affected with amblyopia were (39.5%) with no statistically significant difference in gender with amblyopia (P 0.916).The age more frequently had amblyopia was seven and eight (18.4%), (18.4%) respectively, the different age groups had no statistically significant difference in amblyopic patients (P 0.377).

Conclusion: The prevalence of amblyopia among children between 6-12 years in Hawler Eye Teaching Hospital was high. This needs school screening tests with a qualified medical team, and increase parents' awareness about the necessity of regular vision checking for children with amblyopia for better results.

Keywords: Amblyopia, Hawler, Hyperopia, Prevalence

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Introduction

Amblyopia is one of the preventable visual impairments in children. It is decrease in visual acuity in one eye or less commonly in both eyes with best corrected visual acuity (BCVA) is less than 6/6 (20/20) when there is no clear structural abnormality.[1] It is a neurodevelopmental condition that causes various visual impairments due to aberrant cortical processing of visual input from both eyes during the key time of visual system development.[2] The primary factors that cause amblyopia are: (a) Refractive errors, which can be expressed as high isometropia, which denotes a high refractive error present in both eyes, or as anisometropia, which denotes a significant difference in refractive error between the two eyes; (b) strabismus, when there is eyes misalignment; and (c) deprivation of visual input, which is typically caused by ocular conditions that prevent light from reaching the normal retina like congenital cataract, ptosis and cornea opacity.[3] The description of amblyopia only scratches the surface because it affects many other monocular and binocular functions in addition to visual acuity. More specifically, amblyopia results in defects in fixation instability, poor stereopsis (depth perception), impaired contrast sensitivity (CS), spatial localization, form and motion perception, crowding phenomena (decreased ability to identify and distinguish a certain letter within a row of letters on an E-letter Snellen chart), and visuomotor coordination, all of which have a significant impact on daily activities. It is a prevalent issue in children and has a wide variety of effects on a person's childhood and adult life, as well as the life of the community as a whole. A person's academic achievement, job choice, visuomotor abilities, and social interaction are all significantly impacted by amblyopia.[3-6] Bilateral visual impairment is more likely in children who have unilateral amblyopia.[6] The recorded incidence of amblyopia worldwide is about 1-5% while stated prevalence varies greatly between studies, from 0.05 to 7.54%.[7,8] These studies, which included children of various age groups, are from diverse nations and eras. As a result, it must be assumed that this material is extremely fragmented. The prevalence of amblyopia, as determined by a meta-analysis of 37 research published in 2018, ranged from 0.51% in Africa to 3.67% in Europe.[9,10] In children and young adults, a meta-analysis of 60 papers published in 2019 found a pooled prevalence of 1.44%, with 0.72% in Africa, 1.09% in Asia, 2.41% in America, and 2.90% in Europe.[11]Amblyopia is preventable and, to a certain extent, curable, and it merits the best ophthalmologist care.[12] Early diagnoses is crucial since treatment is more challenging and less effective the later the diagnosis. This is the rationale for the majority of preschool and school vision screening programs, and preventing blindness remains a top concern for the national society.[13] This study aimed to detect the prevalence of amblyopia in Hawler Eye Teaching Hospital for the age 6-12 years and to determine the most common causes and risk factors for amblyopia.

Patients and methods

A cross-sectional study to identify the prevalence of amblyopia and to determine the causes related to amblyopia in Hawler Eye Teaching Hospital for the age 6-12 years' children. In which 300 sample patients were collected from Hawler Eye Teaching Hospital from the 1st of October 2022 to the 1st of April 2023.The inclusion criteria were 6-12 years old children with normal posterior segments. The exclusion criteria were patients younger than 6 years and older than 12 years, as well as any patients with abnormal posterior segments like congenital optic nerve hypoplasia.The demographic data was taken by face-to-face interviews with the patient's parents. Autorefraction and Snellen E-letter LED smart visual chart systems were used for the assessment of children's vision,

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started with monocular unaided test, followed by an aided trial to get the best corrected visual acuity (BCVA). Cyclopentolate eye drop1% for 30-60 min was used for cycloplegic refraction for all children with visual acuity less than 6/6. After two days of cyclopentolate installation subjective refraction was done by well-trained optometrists.A slit lamp assessment of the anterior and posterior segments was done. All children underwent ocular motility and cover- uncover test to detect eye deviation to understand if the amblyopia was due to strabismus. Amblyopia was classified as (yes) when the best corrected visual acuity was 6/12 or worse in one eye, or the difference between the two eyes two lines or more on the best-corrected distance visual acuity when there was no ocular pathology. And (No) if the best corrected visual acuity is 6/9 or better in both eyes.[14,15] The Kurdistan Higher Council of Medical Specialties Ethics Committee accepted the study protocol. Data was entered and analyzed using a statistical package for social sciences version 28 (SPSS Inc, IBM Company, Chicago, Illinois, USA). Descriptive analysis was expressed as frequencies and percentages and the inferential results were compared between the subjects with different variables. The numerical variables were checked for normality using Smirnov – Kolmogorov test, then analyzed using t-test if normally distributed or Mann Whitney U test if not normally distributed. The categorical data were analyzed through Chi square or Fisher's exact test if the expected frequency (value) was less than 5 of more than 20% of the cells in the table, p–values ≤ 0.05 were considered as statistically significant. ANOVA test was used to compare difference in mean between the groups.

Results

A total of 300 children attending Hawler Eye Teaching Hospital were surveyed in this study, was found that 76 of them had amblyopia so the percentage of amblyopia was (25.3%) Figure (1).

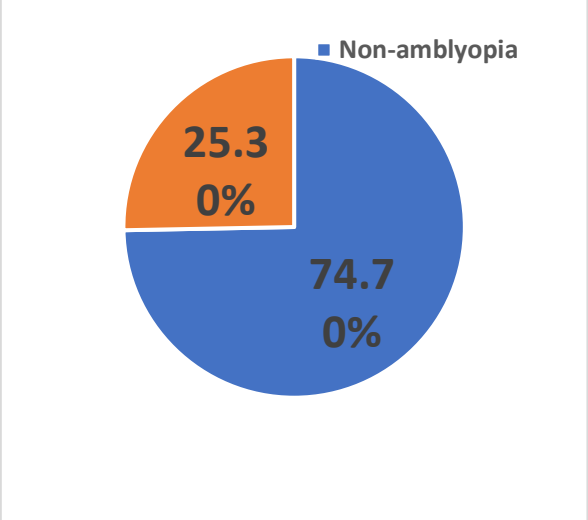

Figure (1): percentage of amblyopia

The most frequent age was seven and eight years (18.4%), (18.4%) respectively, while the least frequent age group was 11 years (10.5%). Most amblyopia cases were male (60.5 %), while only (39.5%) of the cases were female, as presented in Table (1).

Table (1): Percentage of participants according to the age and sex

Variables		Frequency	Percent %
Age in years	6	10	13.2
	7	14	18.4
	8	14	18.4
	9	10	13.2
	10	10	13.2
	11	8	10.5
	12	10	13.2
Sex	Male	46	60.5
	Female	30	39.5
Total		76	100

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There was no statistically significant difference in the prevalence of amblyopia between males, and females (P 0.916) Table (2).

Table (2): Mean type of refraction according to gender

	Form of refraction			Total	p-value
Gender	No refraction error	Anisometropia	Isometropia		
Male	2 (66.7%)	25 (62.5%)	19 (57.6%)	46 (60.5%)	0.916
Female	1 (33.3%)	15 (37.5%)	14 (42.4%)	30 (39.5%)	
Total	3 (100%)	40 (100%)	33 (100%)	76 (100%)	

There was no statistically significant difference in mean age group (P 0.377) Table (3).

Table (3): Mean age group according to the form of refractive error

	N	Mean	Std. Deviation	Minimum Age	Maximum Age
No refraction error	3	8.00	1.732	6	9
Anisometropia	40	9.07	1.966	6	12
Isometropia	33	8.52	1.970	6	12
Total	76	8.79	1.962	6	12

According to Table (4); in most of the amblyopia cases, one eye or unilateral eye were affected (63.2%), while in around one-third of the cases, both eyes or bilaterally were affected (36.8%). The majority of amblyopia cases did not have the disease in their first-degree family members; in contrast, only one-third of them had a positive family history (67.1%, 32.9 %) respectively. The vast majority of the patients were full-term during delivery (94.7 %), while only (5.3%) of the cases had a history of prematurity during delivery.

Table (4): Side of amblyopia, family history of amblyopia, and history of prematurity.

Variables	Categories	Frequency	Percent %
Biaterality	Unilateral eye	48	63.2
	Bilateral eyes	28	36.8
Family history	Negative	51	67.1
	Positive	25	32.9
Prematurity	term	72	94.7
	premature	4	5.3
Total		76	100

Most amblyopia cases were associated with hyperopia (65.8%), followed by astigmatism (17.1%), myopia (11.8%), and compound astigmatism (1.3%) while (3.9%) of the cases had no refraction error. The majority of amblyopia cases did not have strabismus (76.3%), but (19.7%) of the cases had esotropia, while only (3.9%) of amblyopia cases had exotropia type of strabismus. Anisometropia was the most common type of refraction (52.6%), in the contrary isoametropia was the second most common type of refraction (43.3%) Table (5).

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Table (5): Auto-refraction, strabismus, type of refraction, and media causes.

Variables	Categories	Frequency	Percent %
Types of refractive error	no refraction error	3	3.9
	Hyperopia	50	65.8
	Astigmatism	13	17.1
	Myopia	9	11.8
	compound astigmatism	1	1.3
Strabismus	No strabismus	58	76.3
	Esotropia	15	19.7
	Exotropia	3	3.9
Auto-refraction difference between both eyes	no refraction error	3	3.9
	Anisometropia	40	52.6
	Isoametropia	33	43.4
Media causes	no cause	73	96.1
	Cataract	3	3.9
Total		76	100

The refractive causes were the most frequent cause of amblyopia (96.1%), followed by strabismus (23.7%), and the least was media causes which accounted for only (3.9%) of the main causes of amblyopia. The total percentage of causes of amblyopia was more than 100%, as there was more than one cause in the same participant Figure (2).

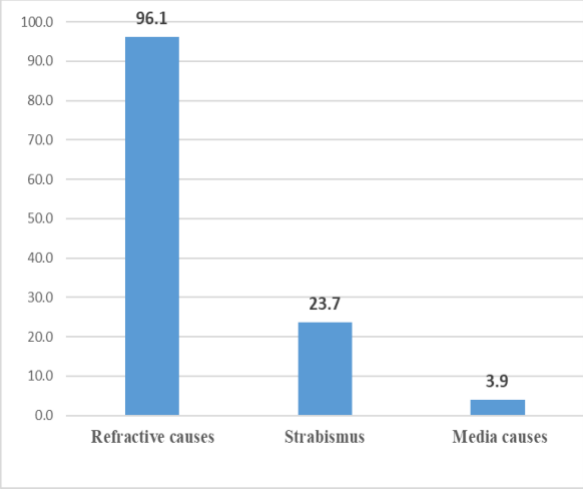

Figure (2): The main causes of amblyopia.

The vast majority of children with amblyopia (96.1%) did not have any media causes like ptosis, cataracts, and corneal scar, while only (3.9%) of the cases had cataracts. as presented in Figure (3).

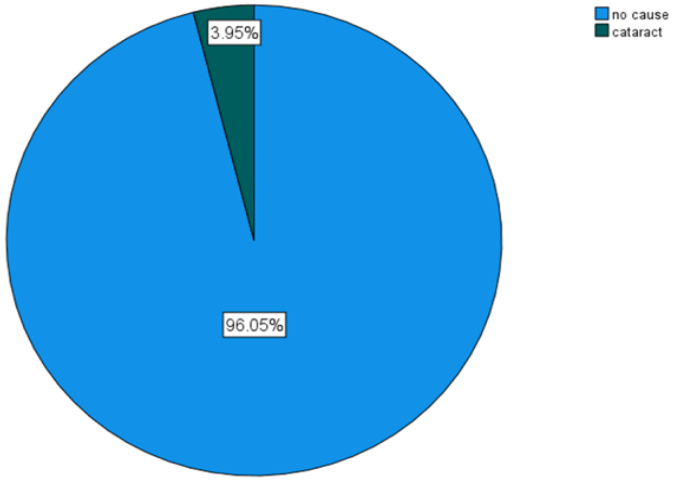

Figure (3): Media causes of amblyopia

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Discussion

This is a hospital-based study at Hawler Eye Teaching Hospital, as eye tests are mandatory for school-age children for the early detection and treatment of amblyopia. [16] This study reveals that the prevalence of amblyopia among children (6–12) was high (25.3%), and the relationship between refractive error and amblyopia was clearly high.The prevalence of amblyopia is higher from studies done by Caca, Al-Salem, and Faghihi with percentage of (2.6%), (2.7%), and (4.6%) respectively.[17-19] Although El- Gendy study had higher rate of amblyopia (6.7%).[20] But still, the percentage was higher in this study, and there was a big difference in the result as this was the only study hospital-based for children aged 6–12 years', so most of our participants had eye issues and needed to visit the hospital. While the other studies were school- based. And many of studies categories the prevalence of amblyopia according to certain age groups. As a study done by Faghihi revealed the prevalence of amblyopia in participant between 5-15 years was (2.24%), in comparison with the age group 55-56 years the prevalence of amblyopia was (7.14%) But this study focused on the causes of amblyopia and the risk factors of amblyopia.Refractive error was the most frequent cause of amblyopia with Hyperopic amblyopia was (65.19%), astigmatism amblyopia was (17.11%) and myopic amblyopia was (11.84%). these percentages go in the same line in study done by Al-Salem found that hyperopia was (64.45%) but myopia was the next most common cause from the total refractive amblyopia (10.43%). In Rashad et al's study found the higher refractive cause of amblyopia was myopia (70.2%).[21] The form of refractive error in this study mostly was as anisometropic amblyopia (52.6%) and isoametropia (43.4%) while in Al-Salem study was (74.88%), in Aldebasi study anisometropic amblyopia was (77.72%), and isoametropic amblyopia was (16.84%), also Al-Haddad revealed in a chart that amblyopia due to anisometropia in the children aged 3 - 15 years, was (36%).[22] The second most common cause of amblyopia in participant children was strabismus (23.7%); in Al-Salem study, strabismus percentage was (9.39%) and in Aldebasi study, strabismus as a cause of amblyopia was (5.44%). This high percentage of strabismic amblyopia in this study because there was an overlap between the refractive and strabismus cases in which all cases of strabismus had some sort of refractive error. The most common type of strabismus associated with amblyopia was esotropia (19.7%); exotropia associated only with (3.9%) of strabismic amblyopia.Media causes were the least frequent (3.9%); in Al-Salem study congenital eye problems including congenital cataract, retinitis pigmentosa, and congenital glaucoma were (0.63%), (1.67%), and (0.84%), respectively, from the total congenital eye problems.Prematurity as a risk factor in this study founded in (5.3%) of the total amblyopic patient, in Al-Salem study, the percentage of amblyopia in children with history of neonatal intensive care unit admission was (5.6%) which was close to this study. In Yassin study amblyopia in a very preterm baby (28 to less than 32 weeks with no retina of prematurity) was (10%).[23] Which was nearly double the result in this study.In the current study, the most age group that had amblyopia was 7-8 years, and in Aldebasi study, the most age group was 10-13years.[8] In this study, males were more frequently affected by amblyopia (60.53%) in comparison to females affected by amblyopia (39.47%), in Al-Salem study, males were more effected with amblyopia than female (54.2%), (45.8%) respectively. But in Al-Rashad study females were more affected with amblyopia than males with percentage of (3.8%), (0.5%), respectively. The amblyopic children with family history of

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amblyopia or refractive error were (32.9%), while those without family history of amblyopia or refractive error were (67.1%). This difference is because of increased family awareness about amblyopia and seeking early medical advice to avoid such problems.The limitation of this study is that it is hospital-based (Hawler Eye Teaching Hospital) for ages 6–12, so the percentage of amblyopia could be higher than real, while the other studies for the same age group were school-based. This study recommends further studies in schools to determine the real prevalence of amblyopia in Erbil, as there is no study.

Conclusion

The prevalence of amblyopia in children aged 6-12 visiting Hawler Eye Teaching Hospital was high. This needs serious intervention by activating school screening vision tests with well-trained medical teams. Also, increasing the cooperation between the ophthalmologist, optometrist, and amblyopic child family will increase the success rate of the treatment.
Early determination and treatment of amblyopia carry a very good prognosis,[24] especially in the young age group.

Conflicts of interest

The author reports no conflicts of interest

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