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Original Article

Prevalence of Ocular Disorders in Children with Intellectual Disability in Special Schools of Hamadan, Iran, 2017-2018

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Abstract

Background and Objective: According to global statistics, in every society, more than 10% of children are born with different characteristics from those of their peers, meaning they are mentally different from their peers. Children with intellectual disabilities are at a greater risk of refractive errors and other ocular problems. Regarding this, the present study was conducted to investigate the prevalence of refractive errors and ocular findings in children with intellectual disabilities studying at the special schools of Hamadan, Iran, within 2017-18.

Materials and Methods: This cross-sectional study was conducted on 90 students with intellectual disabilities studying at the exceptional schools of Hamadan in 2017-18. The data was collected using a checklist recording such data as demographic information, level of education, and eye examination results. Visual acuity, refraction, slit-lamp examination, and fundoscopy were performed by an optometrist and an ophthalmologist. Data analysis was performed in SPSS software (version 16.0; SPSS Inc., Chicago, IL) at a significance level of <0.05.

Results: The mean age of the students was 9.4±2.7 years (age range: 6-18 years). Based on the data, 56 (62.2%) cases were female. With regard to the ocular findings, 78 (86.7%), 16 (17.8%), and 12 (13.3%) students had refractive errors, amblyopia, and strabismus, respectively. The most common refractive error in students was mixed astigmatism (n=66, 73.3%), followed by hypermetropia (n=35, 38.9%). Refractive errors and ocular diseases had a higher prevalence in female students under the age of 11 years and preschoolers; however, this difference was not statistically significant. Out of 78 children with refractive errors, 18 (23.1%) cases had an ocular disease (P=0.063).

Conclusions: According to the findings of this study, the prevalence of refractive errors and eye diseases was higher in children with an intellectual disability than in the general population. Furthermore, the girls and children with a younger age were found to be at a greater risk of ocular disorders. Consequently, the screening or periodic examination of these children is a measure of vital importance.

Keywords: Intellectual disability, Ocular disorders, Refractive errors, Visual impairment

Background

According to global statistics, in each community, more than 10% of children are born with different characteristics from their peers. This group of children is given special attention by the education authorities. There are countries that are already developing special programs for the education of this group. Education in the 21st century considers the four components of learning to live, learning to act, learning to know, and learning to live together [1].

Refractive errors are the fourth leading cause of blindness in the world today. Several studies have been performed to detect refractive errors under the age of 20 years, which have obtained different results. In various societies, the incidence of refractive errors is reported to range from < 1% to 39% [2, 3]. Intellectual disability is known to be a psychological and mental disorder, resulting in the poor or inadequate development of mental capabilities and behavioral disorders in the affected cases, compared to those in their peers. Based on the evidence, intellectual disability has a global prevalence of 3-5% [4].

From the perspective of public health, the evaluation and treatment of eye diseases and refractive errors in children with moderate to severe mental disabilities are measures of vital importance.

Such measures can reduce the cost of future health and social care and also improve the quality of life in the affected individuals [5, 6]. Intellectual disability in children should not be ignored. According to the evidence, 40% of the total population of people with intellectual disabilities are under the age of 14 years, incurring a loss on the economy and workforce of a country [7].

If these mentally disabled children have poor vision due to refractive errors, they cannot be trained to improve their abilities for a better life because visual sense is more important than hearing and speech. Therefore, the timely correction of poor vision in these children will definitely open new horizons of learning for them.

Objectives

Given the relationship between intellectual disability and refractive errors or other eye diseases, this study was conducted to find out the prevalence of refractive errors and eye problems in children with intellectual disabilities.

Materials and Methods

This cross-sectional study was conducted on pre-school and primary school children with an intellectual disability referring to the Ophthalmology Clinic of Farshchian Hospital in Hamadan, Iran, in 2017-2018. The target population of the study was students with intellectual disabilities that were trained in exceptional schools. After making the necessary coordination with the education department, for the sampling purpose, all the exceptional schools of children with intellectual disabilities in Hamadan were identified, and then the students were selected randomly from each school.

The inclusion criteria were: 1) age range of 6-17 years, 2) IQ score of 50-70, and 3) consent of the child or legal guardians. On the other hand, the exclusion criteria were the presence of a systemic disease affecting eye function and blindness. Information about the students' disability was extracted from their IQ file in school. After presenting a complete description to the parents of the students, the checklist, including such data as name, age, gender, school name, grade, and IQ score, was completed. Subsequently, the students were referred to Farshchian Hospital for undergoing ophthalmic examinations.

The children were examined by an optometrist, and their visual acuity was measured by the E Chart. In addition, refractive errors were detected using an autorefractometer and retinoscopy. If their visual acuity was not normal, they were referred to an ophthalmologist for further evaluation. Hypermetropia was defined as the spherical equivalent of higher than +0.5 diopter (SE ≥ + 0.5D). Furthermore, myopia was considered as the spherical equivalent smaller than or equal to -0.5 diopter (SE ≤ -0.5D), and astigmatism was regarded as equal to or greater than 0.5 diopters and axis in the direction of 90±30 degrees opposite (0.5D≤). Additionally, amblyopia was defined as when the difference in the corrected vision of both eyes is more than two lines of E chart. Strabismus was also defined as the misalignment of one eye or both eyes, which, according to the direction of inconsistency, was divided into three categories of esotropia, exotropia, and vertically strabismus. Keratoconus is a degenerative disorder characterized by ectasia and a thin paracentral cornea [8].

Statistical Analysis

Data analysis was performed in SPSS software, version 16. The significance level was less than 5%. The data were analyzed using descriptive statistics, including mean and standard deviation for quantitative and proportional variables and percentage for qualitative variables. Chi-square test was also used to compare the relationship between the qualitative variables.

Results

In this study, 90 intellectually disabled students who were studying in exceptional schools in 2017-2018 were examined. Out of the 90 students enrolled, 56 (62.2%) cases were female. The mean age of the students was 9.4±2.7 years (age range: 6-18 years), and their mean IQ score was 59.1±4.6 (range: 50-70). Furthermore, 37 (41.1%) students were preschoolers (Table 1).

With regard to eye disorders, 78 (86.7%) and 18 (20.0%) cases had refractive errors and amblyopia/strabismus, respectively. The most frequent refractive error was mixed astigmatism. In this regard, almost 60% of the students had astigmatism in one or two eyes. Furthermore, 35 (38.9%) and 30 (33.3%) students were detected with hypermetropia and myopia in one or two eyes, respectively. Astigmatism in one or both eyes was observed in 63 (73.3%) students, with myopic and hypermetropic astigmatism in 27 (30%) and 26 (29.9%) cases, respectively. Additionally, amblyopia and strabismus were found in 16 (17.8%) and 12 (13.3%) students, respectively. However, there was no case of keratoconus (Table 2).

Out of the students with ocular diseases, 18 subjects had refractive errors, while out of 72 patients without ocular diseases, 60 (83.3%) cases had refractive errors, which was not statistically significant. The kappa statistic showed that the

Table 1. Characteristics of the study population

Variable		Number	Percentage
Gender	Girl	56	62.2
	Boy	34	37.8
Grade	Preschool	37	41.1
	First Grade	14	15.6
	Second Grade	8	9.9
	Third Grade	14	15.6
	Fourth Grade	8	8.9
	Fifth Grade	2	2.2
	Sixth Grade	7	7.8
		Average	Standard Deviation
Age (Year)		9.4	2.7
IQ score		59.1	4.9

Table 2. Frequency of refractive errors and ocular diseases in the study population

Eye Problems		Percentage	Abundance
Myopia	No	60	66.7
	Both Eyes	25	27.8
	Left or right eye	5	5.5
Astigmatism	No	24	26.7
	Both eyes	52	57.8
	Left or right eye	14	15.5
Hyperopia	No	55	61.1
	Both eyes	25	27.8
	Left or right eye	10	11.1
Amblyopia	Yes	16	17.8
Strabismus	Yes	12	13.2
Myopia and astigmatism (compound)		27	30.0
Hyperopia and astigmatism (compound)		26	29.9

Table 3. Relationship between variables studied and refractive errors in study subjects

Variable		Refractive errors		P-value (Chi2)	Ocular disease		P-value (Chi2)
		Yes (n=78)	No (n=12)		Yes (n=18)	No (n=72)	
Gender	Girl	50 (64.1)	6 (50.0)	0.348	12 (66.7)	44 (61.1)	0.664
	Boy	28 (35.9)	6 (50)		6 (33.3)	28 (38.9)	
Age	11>	55 (70.5)	7 (58.3)	0.396	11 (61.1)	51 (70.8)	0.425
	11≤	23 (29.5)	5 (41.7)		7 (38.9)	21 (29.9)	
Grade	Preschool	31 (39.7)	6 (50)	0.796	8 (44.4)	29 (40.3)	0.398
	First-Third	32 (41.1)	44 (33.3)		5 (27.8)	31 (43.1)	
	Fourth-Sixth	15 (19.2)	2 (16.7)		5 (27.8)	12 (16.7	

difference between refractive errors and eye disease was 33.3%, which was statistically significant (P=0.031). The findings showed that the prevalence of refractive errors and eye problems was higher in girls, children under the age of 11 years, and preschool students than in the rest of the cases. Nonetheless, the differences observed between the variables studied were not statistically significant (Table3).

Discussion

Based on the findings of this study, almost 80% of the children attending exceptional schools had one of the refractive errors (i.e., myopia, hypermetropia,

and astigmatism). Studies have shown that children with intellectual disabilities attending special schools have a higher prevalence of refractive errors than their normal peers.

Any kind of disability can affect the development and learning of children. This impact on the learning, progress, and quality of life of the child will be much greater in case of the presence of several physical and mental disabilities simultaneously. Whenever there is a disturbance in one of the child's senses, the child tries to use other sensations to compensate. Among other things, sight is one of the important senses in learning, academic achievement, and other life skills. Children with mental or physical disabilities may not receive attention for the correction of refractive errors and eye diseases that can be easily treated. Meanwhile, these disabilities can affect their lives and make it miserable.

Consistent with our findings, in a study performed in 2008 in Turkey, 77% of children with mental disabilities and approximately 40% of healthy children were reported to suffer from refractive errors and eye diseases [5].In a study carried out by Joshi et al. in 2013 in India, more than half of the children studying in special schools had refractive errors [9]. In line with our study, Karadag et al., evaluating 180 patients with intellectual disabilities, found refractive errors as the main ocular disorders observed in 56 out of 166 patients [7]. In another study performed by Akinci et al. (2009) on children with Down's syndrome, nearly 98% of the children had refractive errors.

Refractive errors are even more prevalent in adults with mental disabilities. In a study conducted in 2003 in the Netherlands, it was found that 60% of adults with mental disabilities had refractive errors, with hyperopia and astigmatism having the highest incidence [10]. Van Istardael et al. [11], investigating the data extracted from patient's records, reported a high percentage of eye problems in the medical history of adults with mental disabilities. To the best of our knowledge, limited studies have investigated this issue in Iran. In a study performed by Yekta et al. [12] in 2015, refractive errors were more prevalent in children with learning disabilities than in their healthy peers, while these defects can be treated with simple measures, such as wearing glasses and refractive surgery. In the present study, approximately 60% of children had astigmatism in one or two eyes, which is higher than the rate reported by Yekta et al. This difference might be due to the difference in the study population. Therefore, it is required to perform more comprehensive studies in this domain.

In general, children with intellectual disabilities studying in exceptional schools are more likely to have refractive errors. Accordingly, they are exposed to the risk of poor vision or blindness, as well as lower quality of life, poor academic achievement, and high cost of care. These children (i.e., those with refractive errors and eye diseases) will suffer more in their daily activities. Consequently, they should be subjected to more accurate ophthalmic and optometric examinations.

Our results revealed that nearly one per five children with intellectual disabilities suffers from amblyopia or eye laziness. In most countries, including Iran, amblyopia can lead to important social issues, which plays an important role in reducing vision. The visual pathway in the brain evolves from birth to about 10 years of age. The most important factor driving the development of this pathway is the formation of a clear image of objects on the retina. Regarding this, any factor that prevents this trend, including refractive errors, can lead to amblyopia.

Multiple studies have been conducted about amblyopia in many countries around the world. In addition, numerous statistics have been published on the prevalence of amblyopia and its causes and types. According to a study published in the United States on the prevalence of amblyopia, nearly 2% of Americans suffer from amblyopia [13]. With regard to the types and causes of amblyopia, the most common cause of amblyopia is refractive error, while in other countries, the refractive errors and strabismus tend to be relatively effective or even strabismus is more important. Various intermediary factors, such as the low socioeconomic status of the parents, lack of awareness of the need for using glasses or other methods of treatment, and lack of appropriate and standard tools for detecting refractive errors can be considered in this regard.

Therefore, the high prevalence of amblyopia in the present study can be due to the high incidence of refractive errors, including astigmatism, since approximately 70% of the children in the study had at least one eye with this disorder. Based on the findings of this study, out of 78 patients with refractive errors, 18 (23.1%) cases had an ocular disease, including ophthalmic amblyopia. On the other hand, kappa's concurrency coefficient showed that ocular diseases, including amblyopia, were seen in about 30% of children with refractive errors.

One of the major causes of amblyopia is refractive amblyopia or anisometropia. In this regard, the eye with a lower rate of refractive error makes the image clearer and is usually preferred over the other eye with a high rate of refractive error, thereby resulting in amblyopia in the weaker eye.

In a study performed by Almeder et al. in the United States in 1990, the incidence of significant anisometropia (greater than or equal to 2 diopters) in children under 9 years of age who had refractive errors was reported as 5%, which was lower than the rate obtained for the population of the present study.

In the present study, eye diseases, such as refractive errors, were more prevalent in girls, children under the age of 11 years, and pre-primary schoolers. The probable cause of this finding could be a greater proportion of girls, early diagnosis of the disease, and the diagnosis and correction of the older cases of refractive errors at an earlier age.

Conclusions

Based on the findings of the present study, the prevalence of refractive errors and ocular diseases was high among children with intellectual disability. Furthermore, girls and children with a lower age were at a higher risk of such diseases. Therefore, it is required to give special attention to the screening and periodic examinations of these children.

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Conflicts of Interest

The authors declare no conflicts of interest.

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