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VISUAL SCREENING IN EYE HEALTH PROMOTION OF SCHOOL CHILDREN IN ARACAJU-SE

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Abstract: **Introduction:** At first, it is understood that, through the development process, it is in childhood that diseases are best tracked and present indices of effectiveness in their treatments. the main eye disease found in children is refractive errors, which, if not corrected, can result in visual impairment that will last for a lifetime. In this context, it is important to promote visual health habits, since vision is an inexhaustible source of information perception that influences quality of life and biopsychosocial performance. For this reason, it must be taken into account that visual screening in childhood is a factor in optimizing social development. **Goal**: To calculate the prevalence of children with potential ophthalmic alterations detected through visual screening, compare results obtained from visual screening with those of the ophthalmological consultation of selected children and calculate the impact of refraction correction on visual acuity. **Methodology**: A prospective descriptive quantitative research was carried out, conducting a visual screening in students from the first to the fifth year of the Escola Municipal de Ensino Fundamental Dom José Vicente Távora in Aracaju-SE, followed by an ophthalmological consultation with the selected students. **Results**: The possibility of early diagnosis, ophthalmological referral and screening for visual alterations was obtained. From this, a significant improvement in visual acuity was observed after refractive correction. The results of sociodemographic variables, screening and ophthalmological consultation of the children and adolescents evaluated, the mean age was 8 years (SD: 1.7), with the majority being male (51.5%). Overall, 94.5% of patients with some alteration in the ophthalmologic consultation were identified by one of the ophthalmologic screening tests ($p<0.001$), and these results were statistically significant. **Discussion**: The implementation of visual health prevention strategies in the educational environment gives the student the opportunity to achieve better school performance. However, it is important to emphasize that this work does not depend exclusively on teaching centers for its performance, it is up to specialized entities aimed at carrying out promotion and prevention activities to work for the benefit of the community and in this case of children who may have visual health changes. **Conclusion:** Visual screening followed by ophthalmologic consultation is a significant means of improving visual acuity and quality of life. Thus, a way to optimize this process for a greater population reach must be considered.
Keywords: Visual Screening; Prevalence; Visual Acuity; Children.

INTRODUCTION

Vision is seen as one of the senses of the human body that most interferes in its development, being important for communication with the external environment and indispensable for an adequate development (GRANZOTTO JA et al, 2003; OESCHLER RA, 2002; LOPES GJA et al, 2002). Responsible for much of the sensory information we receive from everything around us (GRANZOTTO JA et al, 2003; LOPES GJA et al, 2002).

The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being". So, it is essential to have healthy lifestyle habits such as: adequate nutrition, physical exercise, health prevention, good employment relationship, a good relationship with the environment and a benevolent social coexistence.

In addition to influencing the practice of healthy living habits, psychosocial development and learning, low acuity also implies a reduction in the quality of life, including with regard to economic life, representing a loss of workforce and an

onerous burden to society. (GRANZOTTO JA et al, 2003; OESCHLER RA, 2002).

Through vision we perceive a wide range of shapes, colors, people and landscapes, it is part of our body expression and our personality; it allows us to learn, which from childhood is a gateway to discovering everything new and, in adulthood, an aid to review what has been lived. Detecting and preventing visual changes at the right time is crucial to avoid a possible deficit in school performance, so that the young person can develop activities without interruption, and have an adequate performance in the academic, recreational and civic activities of the study plan.

Refractive errors are highlighted as a public health problem in children, being the main cause of visual impairment in schoolchildren. Refractive errors (myopia, hyperopia, astigmatism and presbyopia) are recognized as one of the most prevalent groups of eye disease worldwide.

According to Kara José (1994), uncorrected refractive errors are the main cause of visual impairment among Brazilian children. The WHO recognized, in 2006, the existence of 153 million people blind due to uncorrected refractive errors. This number could exceed 300 million people if the cases of uncorrected presbyopia were added together. It is estimated that for every 100 children under 15 years old without access to adequate care in the area of visual health, about 63 have uncorrected refractive errors, which can be diagnosed and corrected with appropriate devices (BARBOSA et al, 2017).

In addition, the implementation of visual screening protocols in primary health care is the most effective way to detect children who have the potential for visual impairment in a period still possible for effective treatment (NYE, 2014; GE, 2020). However, the implementation of national public policies for children's eye health care in a legalized way is still part of future commitments by the regulatory and representative bodies of Brazilian Ophthalmology (OTTAIANO, 2019).

In the capital of Sergipe, Aracaju, visual screening in children from municipal public schools is carried out through the Saúde na Escola program, but it includes older children, failing to detect preventable causes of low vision at younger ages and thus preventing amblyopia, that is, the failure in the process of developing unilateral or bilateral visual acuity, due to lack of adequate stimulus or abnormal or insufficient visual stimulus.

It is understood that the critical period of visual development starts from birth, with rapid speed during the first year of life, and continues until 6 to 8 years of age. The ability to screen for ophthalmic diseases during this period allows not only to assess the epidemiological profile of refractive errors in this population, but also brings with it an invaluable opportunity to prevent childhood blindness (ALVES, 2014).

Thus, taking into account the mentioned aspects, the objectives of this study are to calculate the prevalence of children with potential ophthalmological alterations detected through visual screening and to compare the results obtained from the visual screening with those of the ophthalmological consultation of selected children and to calculate the impact of the correction. refraction in visual acuity. In addition to, in a future perspective, preparing pedagogy professionals regarding the perception of signs that indicate visual and ocular alterations and, finally, encouraging volunteers regarding the importance of pediatric ophthalmology and social projects in schools.

METHODOLOGY

This project, approved by the Research Ethics Committee of the Federal University

of Sergipe, was carried out in partnership with the Municipal Education Department of Aracaju, Sergipe Society of Ophthalmology (SSO), Instituto Rotary, Instituto Ver e Viver, International Federation Medical Students Association Brazil UNIT (IFMSA Brazil UNIT), Academic League of Ophthalmology of Sergipe, Tiradentes University (LIOF-SE) and several volunteers not linked to institutions.

It was a social project developed with the goal of providing an improvement in the quality of life of students in the public network through the correction of visual acuity with the delivery of glasses and referral to a specialized service if necessary.

After obtaining authorization, trained volunteers performed a visual acuity screening and doctors specialized in ophthalmology performed a complete ophthalmological consultation in the selected students. The population studied was a sample of children enrolled from the first to the fifth year of elementary school at Escola Municipal de Ensino Fundamental Dom José Vicente Távora, located in the city of Aracaju-SE, state of Sergipe. The screening was carried out at the school itself, for 4 weeks, at previously scheduled days and times, once a week.

2 to 3 teams of 4 people were trained, made up of volunteers, mostly medical students. Each team used the following work instruments on the screening day: enrollment and examination form, pens, a 3-meter cord, a visual acuity table with LEA SYMBOLS optotypes in ETRDS pattern, an eye occlusion paddle, a responses with LEA SYMBOLS optotypes, close-up figure, warning letters to parents of the screening result.

Categorical variables were described using absolute and relative percentage frequencies. Continuous variables were described as mean, median, standard deviation and interquartile range. The hypothesis of independence between categorical variables was tested using Pearson's Chi-Square and Fisher's Exact tests. The hypothesis of non-reproducibility between screening and consultation results was tested using the McNemar and McNemar-Bowker tests. The significance level adopted was 5% and the software used was R Core Team 2022 (Version 4.2.1).

The children were screened by school class, in a suitable space, and each student to be screened went through 4 stations. A free and informed consent form (ICF) was sent to parents at least 7 days in advance. The four visual screening stations will be detailed below.

STATION NUMBER 1 - CHECK-IN

This station aimed to fill in the participant's screening form and collect the informed consent sent to parents. An examination form containing space for recording visual acuity, cover test and ocular motility was filled in with the child's name, date of birth, age, sex, grade and class. Each child received a badge with a code created specifically for that class and school, without identifying the name. This code identified the screening form and served to anonymize all data collected for later stages of the study, such as ophthalmologic consultation.

STATION NUMBER 2 - VISUAL ACUITY

It was measured in each eye separately, always starting with the right eye. Before starting the test, the LEA SYMBOLS figures were presented through the template, as well as the test procedure was explained. Visual acuity was measured by the LEA SYMBOLS table in ETDRS standard, at 3 meters. The test started by showing an optotype of each line, starting with the 20/80 line, progressively decreasing until reaching the line with the smallest size visualized. The value of the

smallest line where it was possible to identify at least 4 optotypes of this line was considered.

The template with the 4 LEA SYMBOLS optotypes that could be used to identify the visualized figure was given to the children. This facilitated the measurement of acuity in those children with speech difficulties. Individuals who did not cooperate or who had difficulty understanding the exam were considered not applicable and were forwarded directly to the next exam station and for an ophthalmologic consultation.

The visual acuity cut-off point was the result less than 20/32 in one eye, measured by the ETDRS standard table, or an interocular difference of 2 lines or more.

STATION NUMBER 3 - COVER AND EYE MOTILITY TEST

This station aimed to identify changes in Ocular Motility and Cover Test. The examiner performed the alternate Cover Test using a fixation figure for near and far, and evaluated changes in binocular rotations. The cut-off point for this assessment was the presence of any alteration in ocular motility or in the cover test.

STATION NUMBER 4 - CHECK OUT

At this station, the researcher visualized the data from the exam form and delivered an information letter to the parents, advising that the child had passed the visual screening or not. visual acuity examination was referred for a complete ophthalmologic consultation.

This consultation was performed by ophthalmologists from the research team or ophthalmology residents under supervision, in offices linked to the medical residency program or assisted by the Unified Health System. Appointments were scheduled and each student was taken to the location by transportation provided by the Municipal Department of Education.

On the day of the consultation, the child went through 3 new stations:

I. Check in: in which an exam form was filled out with identification data such as name, age, school, grade, class and shift. The measurement of the interpupillary distance was performed, which is important for the manufacture of glasses, if necessary. Soon after, the child underwent pupillary dilation using 10% cyclopentolate and 1% tropicamide eye drops. Children who reported fever in the last 24 hours or seizures in the last 30 days did not undergo pupil dilation and had their appointments rescheduled.

II. Ophthalmological consultation: it was performed by evaluating Refraction under cycloplegia, visual acuity with the best correction, Cover test for near, Biomicroscopy and Eye fundus evaluation;

III. Check out: at this station, the glasses frames were chosen by the children who needed them, a letter was delivered to the parents of science, informing whether or not the children needed to wear glasses or referral to an ophthalmological outpatient follow-up for those who presented any motility alteration. ocular, fundus or amblyopia.

INCLUSION AND EXCLUSION CRITERIA IN THE STUDY

According to Fontelles (2009), descriptive quantitative research is one that works with variables expressed in the form of numerical data and employs rigid resources and statistical techniques to classify and analyze them, such as percentage, average, standard deviation, correlation coefficient and regressions, among others.

In this sense, the following inclusion criteria were admitted: children enrolled in the municipal public network of Aracaju-SE between the first and fifth year of elementary

school, with an average age of 8 years, since the visual screening tests would have more results in this specific group. As for the exclusion criteria used, they are: children of school age below the first year or above the fifth year of elementary school. The inclusion and exclusion criteria presented were used at all stages of the study selection process.

RESULTS AND DISCUSSION

The table below shows the results of the sociodemographic variables, screening and ophthalmological consultation of the children and adolescents evaluated. The mean age was 8 years (SD: 1.7), with the majority being male (51.5%). At screening, visual acuity of the left eye was considered altered in 16.8% and in the right eye 14.7%, 11.6% have unilateral alteration and 9.9% have bilateral alteration. In the Cover Test, it showed changes in 2.6% (convergent, divergent, vertical and nystagmus), in binocular rotations, it showed changes in 2.2% (nystagmus and other changes). Then, 130 (28%) children were referred for consultation with an ophthalmologist, however only 99 (21.3%) attended.

	n	%	Average (DP)	Median (IIQ)
Age	464	100,0	8 (1,7)	8 (7;9)
Gender				
Female	225	48,5		
Male	239	51,5		
With glasses				
Yes	21	4,5		
No	443	95,5		
Visual acuity OD Screening				
Modified	78	16,8		
Normal	378	81,5		
The person didn't peform it	8	1,7		
Visual acuity OE Screening				
Modified	68	14,7		
Normal	388	83,6		
The person didn't peform it	8	1,7		
Visual acuity screening				
Without change	356	76,7		
Unilateral	54	11,6		
Bilateral	46	9,9		
The person didn't peform it	8	1,7		
Changing cover screening test				
Modified	12	2,6		
Normal	448	96,6		
The person didn't peform it	4	0,9		
Changing binocular rotations				
Modified	10	2,2		
Normal	450	97,0		
	4	0,9		

Legend: de – absolute frequency. % – percentage relative frequency. DO – Standard Deviation. IIQ – Interquartile Range.

Table 1. Queries performed.

Of the 99 children and adolescents who attended the ophthalmologic consultation, 10.1% presented alterations in the Cover Test (convergent, divergent, vertical deviation and esophoria), 1% presented alterations in binocular rotations (alteration in abduction A), 2% presented changes in biomicroscopy in the right eye (palpebral cleft does not close and conjunctival hyperemia) and 1% in the left eye (facial palsy). Still, 2% had changes in the funduscopy of the right eye (change in the papilla and excavation) and left (change in the papilla and excavation) and 57.6% had the need for glasses. 10.1% were referred for ophthalmologic follow-up because they had other diseases in addition to refractive error, such as amblyopia, strabismus, esotropia, myopia, cavitation, congenital cataract and visual difficulty that did not improve with refraction, being referred to a pediatric

ophthalmologist or pediatrician.

	n	%
Cover		
Modified	10	10,1
Normal	82	82,8
The person didn't peform it	7	7,1
Binocular Rotations		
Modified	1	1,0
Normal	91	91,9
The person didn't peform it	7	7,1
Biomicroscopy OD		
Modified	2	2,0
Normal	94	94,9
The person didn't peform it	3	3,0
Biomicroscopy OE		
Modified	1	1,0
Normal	95	96,0
The person didn't peform it	3	3,0
Fundoscopy OD		
Modified	2	2,0
Normal	94	94,9
The person didn't peform it	3	3,0
Fundoscopy OE		
Modified	2	2,0
Normal	94	94,9
The person didn't peform it	3	3,0
The person needs to wear glasses		
Yes	57	57,6
No	39	39,4
Not evaluated	3	3,0
Changes in eye consultation		
Modified	58	58,6
Normal	38	38,4
The person didn't peform it	3	3,0

Caption: n – absolute frequency. % - percentage relative frequency.

Table 2. Result of the ophthalmological consultation.

Regarding the reproducibility of the screening result in the ophthalmological consultation, we can observe that 65.5% of the patients with some alteration in the ophthalmological consultation were correctly detected in the Visual Acuity Test in the right eye (p=0.644), 61.8% in the Visual Acuity Test in the right eye. Visual acuity in the left eye (p=0.875) and 87.3% in the unilateral or bilateral visual acuity test (p=0.581), and these results were not statistically significant. In the Cover Test of screening, 5.2% were correctly detected (p<0.001) and in binocular rotations 6.9% were correctly detected (p<0.001), these results being statistically significant. Overall, 94.5% of patients with some alteration in the ophthalmologic consultation were identified by one of the ophthalmologic screening tests (p<0.001), and these results were statistically significant.

	Changes in the ophthalmological consultation		
	Yes n (%)	No n (%)	p value
Gender			
Female	28 (48,3)	21 (55,3)	0,537 [F]
Male	30 (51,7)	17 (44,7)	
With glasses			
Yes	6 (10,3)	0 (0,0)	0,078 [F]
No	52 (89,7)	38 (100)	
Acuidade Triagem OD			
Modified	36 (65,5)	23 (62,2)	0,644 [M]
Normal	19 (34,5)	14 (37,8)	
Acuity screening - OE			
Modified	34 (61,8)	19 (51,4)	0,875 [M]
Normal	21 (38,2)	18 (48,6)	
Acuity screening			
Without change	7 (12,7)	8 (21,6)	0,581 [Q]
Unilateral	26 (47,3)	16 (43,2)	
Bilateral	22 (40)	13 (35,1)	
Changing cover screening test			
Modified	3 (5,2)	3 (7,9)	<0,001 [M]
Normal	55 (94,8)	35 (92,1)	
Changing binocular rotations			
Modified	4 (6,9)	2 (5,3)	<0,001 [M]
Normal	54 (93,1)	36 (94,7)	

Change in eye screening			
Modified	52 (94,5)	32 (86,5)	<0,001 M
Normal	3 (5,5)	5 (13,5)	

Caption: n – absolute frequency. % – percentage relative frequency. F – Fisher's Exact Test. M – McNemar test. Q - Pearson's Chi-Square Test.

Table 3. Comparative table between Screening and Ophthalmological Consultation.

CORRECTION OF REFRACTIVE ERRORS

Table 4 shows the reproducibility of the Visual Acuity Test at screening and post-consultation in the right eye. We can observe that 93.9% of the participants in the Modified screening evolved to normal (p<0.001), which is a statistically significant result.

		Acuity Screening - OD		
		Modified n (%)	Normal n (%)	p value
Post Consultation Acuity - OD				
Modified		3 (6,1)	0 (0,0)	<0,001
Normal		46 (93,9)	29 (100)	

Caption: n – absolute frequency. % – percentage relative frequency. Test of McNemar.

Table 4. Acuity after consultation of the right eye.

Table 5 shows the reproducibility of the Visual Acuity Test at screening and post-consultation in the left eye. We can observe that 93% of the participants in the Modified screening evolved to normal (p<0.001), which is a statistically significant result.

	Acuity Screening - OE		
	Modified n (%)	Normal n (%)	p value
Post Consultation Acuity - OE			
Modified	3 (7)	1 (2,9)	<0,001
Normal	40 (93)	34 (97,1)	

Caption: n – absolute frequency. % – percentage relative frequency. test of McNemar.

Table 5. Reproducibility of the Left Eye Acuity Test.

Table 6 shows the reproducibility of the Visual Acuity Test at screening and post-consultation for the situation of both eyes. We can observe that 97.1% of the participants in the screening with unilateral alteration evolved to no alteration, 89.7% of the bilateral ones evolved to no alteration, and these results were statistically significant.

	Acuity Screening			
	No change n (%)	Unilateral n (%)	Bilateral n (%)	p-value
Post Consultation Acuity				
Without changes	15 (100)	33 (97,1)	26 (89,7)	<0,001
Unilateral	0 (0,0)	0 (0,0)	1 (3,4)	
Bilateral	0 (0,0)	1 (2,9)	2 (6,9)	

Caption: n – absolute frequency. % – percentage relative frequency. test of McNemar-Bowker.

Table 6. Reproducibility of the Acuity Test left eye both eyes.

STATISTICAL ANALYSIS

It is recommended that your students attend a visual and eye health professional, they usually make this recommendation at the beginning of the year, a general checkup. They do not indicate to their students a specific frequency for students, often depending on

whether the student has difficulties in their visual and eye health, they observe them to guide when there is a check-up.

Sometimes schools do not require a certificate of visual aptitude, as there are parents or guardians who do not have the economic resources. Because of this, teachers have no way of informing themselves whether or not the students went for the check-up, other teachers do not care about the outcome of the consultation or often do not know whether the parent carried out the process or not. However, it is known that the identification of visual problems must be done through the concern brought by the parents and the attention of the health professional. If any alteration is suspected, from that moment on, the child must be referred to a specialist (RAHI et al., 2001).

For these situations, it is necessary to have the support of entities that are concerned with the integrated health of students who have economic difficulties. This study aimed to promote the practice and promotion of visual health at school level, in order to improve people's health level, instilling healthy habits and styles, and thus involving the family, school and community, analyzing biological, psychological, social and cultural dimensions, which go hand in hand to fully realize a positive impact process.

CONCLUSION

It is understood, therefore, that visual screening followed by ophthalmologic consultation is a significant means of obtaining correction of visual acuity and improving quality of life. Thus, thinking of a way to optimize this process for a greater population reach must be a priority. With this, it is expected to expand the democratization of access to information on visual acuity and its due importance in the pediatric age group, making needy children achieve an effective resolution to the problem.

In addition, it is necessary to prepare pedagogy professionals regarding the perception of signs that indicate visual and ocular changes, as educated professionals would have greater access to students. Finally, there is an effective contribution from both parties, as volunteers and organizers, since by participating in the action they will learn more about the area of pediatric ophthalmology and understand the importance of social projects in schools.

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