Cogitare Enfermagem

ORIGINAL ARTICLE

PREVALENCE OF LOW VISUAL ACUITY IN CHILDREN OF A PUBLIC SCHOOL

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ABSTRACT

Objective: To verify the prevalence of low visual acuity in schoolchildren of the Federal District.
Method: A quantitative and cross-sectional study conducted with 166 children, and with their respective guardians, enrolled in a public school of the Federal District. The Snellen Optometric Chart was used and questionnaires were applied. The data were submitted to descriptive and inferential statistical analysis.
Results: 111 (66.87%) schoolchildren presented low visual acuity, and 126 (75.9%) have never received any care related to eye health. Of the 13 schoolchildren who wore corrective lenses, 11 (84.6%) had a visual acuity below 0.8, even with their use.
Conclusion: The high prevalence of low visual acuity reveals weaknesses in the prevention of the students' visual problems and demands the planning of continuous and effective actions to prevent blindness and to promote eye health in childhood.

DESCRIPTORS: Visual Acuity; Eye Health; School Health Services; Primary Health Care; Public Health Nursing.

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PREVALÊNCIA DE BAIXA ACUIDADE VISUAL EM CRIANÇAS DE UMA ESCOLA DA REDE PÚBLICA DE ENSINO

RESUMO

Objetivo: verificar a prevalência de baixa acuidade visual em escolares do Distrito Federal.
Método: estudo quantitativo, transversal, realizado com 166 crianças e seus respectivos responsáveis, matriculadas em uma escola da rede pública de educação do Distrito Federal. Aplicou-se a Escala Optométrica de Snellen e questionários. Os dados foram submetidos à análise estatística de cunho descritivo e inferencial.
Resultados: 111 (66,87%) escolares apresentaram baixa acuidade visual, sendo que 126 (75,9%) crianças nunca receberam nenhum atendimento relacionado à saúde ocular. Dos 13 escolares que faziam uso de lentes corretivas, 11 (84,6%) apresentaram acuidade visual menor que 0,8 mesmo com a correção.
Conclusão: a elevada prevalência de baixa acuidade visual identificada revela fragilidades nas ações de prevenção de problemas visuais dos estudantes e demanda planejamento de ações contínuas e efetivas em prol da prevenção da cegueira e da promoção da saúde ocular na infância.

DESCRITORES: Acuidade Visual; Saúde Ocular; Serviços de Saúde Escolar; Atenção Primária à Saúde; Enfermagem em Saúde Pública.

PREVALENCIA DE AGUDEZA VISUAL REDUCIDA EN NIÑOS DE UNA ESCUELA DE LA RED PÚBLICA DE ENSEÑANZA

RESUMEN:

Objetivo: verificar la prevalencia de agudeza visual reducida en alumnos del Distrito Federal.
Método: estudio cuantitativo y transversal realizado con 166 niños, y sus respectivos tutores, matriculados en una escuela de la red pública de educación del Distrito Federal. Se aplicaron la Escala Optométrica de Snellen y cuestionarios. Los datos fueron sometidos a análisis estadístico de carácter descriptivo e inferencial.
Resultados: 111 (66,87%) alumnos presentaron agudeza visual reducida, y 126 (75,9%) niños nunca acudieron a ninguna cita médica relacionada con su salud ocular. De los 13 alumnos que usaban lentes correctoras, 11 (84,6%) presentaron un valor de agudeza visual inferior a 0,8, incluso con la corrección.
Conclusión: la elevada prevalencia de agudeza visual reducida revela debilidades en las acciones de prevención de los problemas visuales de los estudiantes y exige que se planifiquen acciones continuas y efectivas con vistas a prevenir la ceguera y de promover la salud ocular en la infancia.

DESCRIPTORES: Agudeza Visual; Salud Ocular; Servicios de Salud Escolar; Atención Primaria de la Salud; Enfermería en Salud Pública.

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INTRODUCTION

Vision is a sense which enables individuals to develop perception and knowledge of the environment and of themselves from birth and throughout life. The deficiency of this sense in childhood can cause important harms, such as delays in the child's global development, as the visual function is responsible for neuro-psychomotor and perceptual integration, that is, gestures, perceptions, and behaviors are learned based on the feedback of their actions to external stimuli [1].

The World Health Organization (WHO) considers that approximately 80% of the cases of visual impairment are preventable [2]. In Brazil, it is estimated that nearly 20% of the school-age children have uncorrected visual difficulties and that, for every thousand elementary school students, 100 have refractive errors and need glasses for visual correction [3].

The prevention of visual problems is appropriate in the context of primary health care, with the school setting as a strategic field, since many children can be reached through health education actions [4].

Policies such as the Health at School Program (*Programa Saúde na Escola*, PSE) include several inter-sectoral actions, including early identification of visual alterations in the school setting by primary care teams, represented mainly by nurses who, with the support of educators, prevent permanent visual impairment and encourage the self-care of children and their families [3,5]. The Visual Acuity Test recommended by the PSE uses the Snellen Optometric Chart, one of the best and most sensitive indicators of the visual function [6].

In view of the relevance of the topic for health and for child development, and of the availability of actions to prevent visual impairment in the school setting, this study aimed at verifying the prevalence of low visual acuity in children from a school of the Federal District (DF), a federative unit with limited number of studies on this theme.

METHOD

This is a descriptive, quantitative, and cross-sectional research carried out with students from a public school in the FD, whose public is made up of children in kindergarten and elementary school 1.

The selected school is located in São Sebastião, Administrative Region of the FD, with an urban population of 100,161 inhabitants, of whom 22,761 (22.73%) are in the age group from 0 to 14 years old. The majority of the population is made up of females who declare themselves brown-skinned, did not complete elementary school, and have a per capita income of R$985.18 [7].

São Sebastião is part of the Eastern Health Region of the FD and has 25 Family Health teams, 22 of which are urban and three, rural. This territory is the setting for the Multi-professional Internship Program in Primary Care of the Brasília University Hospital, context in which this research is inserted, as the Visual Acuity (VA) evaluations were one of the care practice activities linked to the PSE.

The study participants were schoolchildren, and their respective guardians, in the first five years of elementary school, and in the age group from six to 12 years old, due to the recommendation of the Ministry of Health that the test be carried out from the age of five years and one month old [3]. Children who used corrective devices but did not have glasses/lenses at the time of the evaluation were excluded from the sample.

Given the target population of 811 students, the sample was calculated using the

formula $n=((Z.\sigma)/d)^2$, where Z: abscissa of the standard normal curve, with a confidence level set; σ: standard deviation of the population, expressed in variable units; and d: sampling error, expressed in the unit of the variable, that is, the margin of error.

Based on previous studies, the frequency of school-aged children with uncorrected visual difficulties was considered at 20%. A 95% confidence level and a 3% margin of error were adopted, so the calculated sample size was 170 children.

Simple random stratification was established for sampling, with the five school years being defined as the strata. The sample was organized in alphabetical order (regardless of the grade/year) and, by means of the random distribution function in an Excel list, the proportionalized number by the importance of each school year was drawn, showing the following proportion: 1st year with 43 children, 2nd year with 29, 3rd year with 34, 4th year with 29, and 5th year with 35 children.

Data collection took place in June, August, September, and October 2018. The participants were invited to participate in the research according to the generated randomization list and, in case of refusals, the process continued with the subsequent individual. It is highlighted that fifteen initially randomized students had canceled their enrollments and that one student had a medical certificate during the collection period. There were 49 refusals to participate in the research by the guardians, and two by the schoolchildren. The justifications for the refusals included absence of ophthalmic complaints from the children, previous use of corrective lenses by the children, disbelief in the follow-up of the referred users, and the fact that the researchers did not offer glasses.

Before collection, a meeting was held with the school's principal and teachers, in addition to an extraordinary school meeting for guardians and schoolchildren to present the objectives and ethical aspects of the research. The guardians were informed that the researchers would carry out referrals to health services in case low VA was detected in the children.

The following materials were used to measure VA: Snellen Optometric Chart, occlusion card, chair, measuring tape, and printed form for recording the results. The tests were carried out in classrooms, with good lighting, offering individualized care, and free from distractions. The screening was performed by a single evaluator, previously trained by a nurse with expertise in the area and who works in a reference center in ophthalmology.

The logistics sought to minimize inconveniences in the school routine, since data collection coincided with the schoolchildren' study shift; thus, the dates and times were agreed in advance with the school principal and teachers.

In the screening, the Chart was fixed to a wall at a distance of three meters from the student, in a chart adapted to the A4 sheet size (21 x 29.7 mm), listing optotypes from line 1 (20/200) to line 8 (20/20)[8], which can also be represented by the respective decimal numbers corresponding to the fraction of each line.

The Snellen fraction expresses the relation of decimal notation in which the numerator represents the distance between the person examined and the chart, with the value of 20 being standardized, corresponding to the distance of 20 feet, or 6 meters[8]. The denominator represents the distance that emmetropic eyes would read the optotype that the examinee read[8]. That is, if the perceived VA is 20/50, or 0.4, it means that the examinee read from a distance of 20 feet what a person with normal vision in terms of eye refraction would read from a distance of 50 feet (15 meters). These fractions are adopted for any distance from the chart, as they are conventional values; the most important aspect is the adaptation of the chart for distances other than 20 feet/6 meters[9].

The illiterate "E" chart was used for students from the 1st to the 3rd year, and the alphabetical chart was used for the 4th and 5th year, fixed at eye level[8]. The schoolchildren were prepared in pairs to perform the test through demonstrations and clarifications of doubts by the examiner before starting the screening.

The children were placed on chairs at a distance of three meters from the chart and they were asked to indicate the corresponding letter. The indicated letters were individually pointed out in the chart with a pen used by the examiner. Each eye was evaluated separately, using the occluder card over the opposite eye, always starting with the right eye. If the children were wearing corrective lenses at the moment, they performed the test using the lenses and were subsequently evaluated without them.

After the evaluation, all the students who obtained values of VA with correction below 0.8 or who presented eye complaints were referred to ophthalmologists from the public health network of the FD.

A questionnaire was applied to characterize the participants, which was filled out by the child's guardians, with its content referring to age, gender, grade/year, use of lenses and/or glasses, and previous appointments in ophthalmological services. The research also included a form with questions about the children's self-assessment of vision quality and symptoms for low VA. Data collection was carried out individually by the researcher, minutes before the screening.

The data obtained were encoded with double entry in Excel 2016 spreadsheets and processed in the SPSSS software, version 22.0, to conduct statistical analyses of a descriptive and inferential nature. The Chi-Square test of independence was applied and a significance level of 5% was adopted.

The research was approved by the Research Ethics Committee of the Health Sciences School of the University of Brasília, under opinion number 2,567,280. The participants' consent was given after signing the Free and Informed Assent Term, prepared with a language appropriate for the children's age group, as well as the Free and Informed Consent Term addressed to the legal guardians.

RESULTS

The final sample consisted of 166 children, as four schoolchildren did not wear glasses at the time of the assessment because their glasses were broken, were lent to another family member, or were inadequate.

It was verified that 87 (52.4%) children were female, with the majority of children being brown-skinned, totaling 70 (42.2%) individuals, followed by 57 (34.3%) white-skinned children, 24 (14.5%) black-skinned children, and 15 (9%) yellow-skinned and indigenous children.

Among the guardians, 94 (56.6%) stated that they had already noticed some difficulty or problem related to vision in their children. However, 126 (75.9%) children had never received any care related to eye health (Table 1).

Table 1 – Students' previous ophthalmic appointments. Brasília, DF, Brazil 2018

Students' previous ophthalmic appointments	N	%
Never	126	75.9
In the public service	20	12.05
In private practice and/or health plan	20	12.05
Total	166	100

It was evidenced that 23 (13.9%) children had their last appointment one or less than one year ago and 14 (8.4%), two or more years ago; and that, of the total sample, only 24 (14.5%) received some treatment such as the use of glasses, eye drops, medication, or surgery.

Regarding eye complaints, headache and reading difficulties stood out (Figure 1). With regard to the children's self-assessment of vision quality, 64 (38.8%) rated their vision as good, 101 (61.2%) rated it negatively, and one child was unable to specify, totaling 165 students for analysis purposes (Table 2).
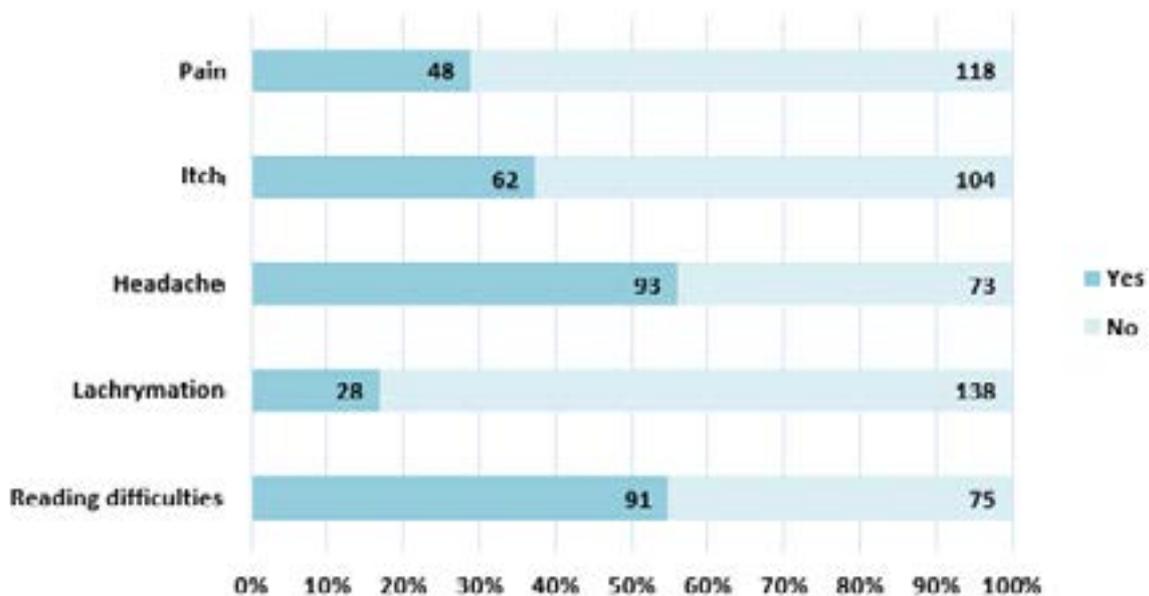

Figure 1 – Distribution of the students' main eye complaints. Brasília, FD, Brazil, 2018

Table 2 – Distribution of the students' self-assessment of vision quality. Brasília, FD, Brazil, 2018

Students' self-assessment of vision quality	N	%
Good	64	38.8
Moderate	75	45.45
Bad	26	15.75
Total[†]	165	100

†One child was unable to specify.

The 166 students in the sample had their VA assessed, and 111 (66.87%) presented low VA, that is, below 0.8, in one or in both eyes. The corrected VA of those children who wore glasses at the time of assessment was the one considered for analysis.

When relating the prevalence of low VA to the schoolchildren' self-assessment of

their vision, the Chi-Square test showed a tendency to significance, with a p-value=0.059.

Table 3 shows the VA values in each evaluated eye of the students.

Table 3 – Distribution of the sample according to the respective values of visual acuity assessed in the right and left eyes of the students. Brasília, FD, Brazil, 2018

Visual Acuity	Left Eye‡		Right Eye	
	(n)	%	(n)	%
0.1 to 0.2	2	1.21	1	0.60
0.3 to 0.5	24	14.55	28	16.87
0.6 to 0.7	76	46.06	74	44.58
0.8	63	38.18	63	37.95
Total	165	100	166	100

‡One child was unable to identify the largest optotype in the assessment of the Left Eye.

It is important to note that, of the 13 children who wore glasses during the screening, 11 (84.6%) presented a VA value below 0.8 even after the correction.

DISCUSSION

The eye health screening carried out in the schools is a sensitive and cost-effective strategy for the early detection of low vision and blindness and in the reduction of child morbidity, mainly adopted by developing countries, where barriers to access the health services are common[4].

This study showed a prevalence of low VA of 66.87% (n=111) in the schoolchildren, exceeding the estimate of 20% of the school-age children foreseen in the PSE thematic notebook[3]. This data is also in contrast to the frequencies presented in other Brazilian states, such as Amazonas[6], with 6.3%; Minas Gerais, with 34.8% in 2010[10] and recently, in 2018, with 14.5%[11]; Santa Catarina[12], with 9.4%; Rio Grande do Sul[13], with 10.88%; and São Paulo[14], with 13.1%.

In recent international studies that assessed schoolchildren, a prevalence value of 10.1% was verified in the urban population of Indonesia[15], 5.8% in Ethiopia[16] and, in a representative study carried out with multi-ethnic children in rural schools in China[17], approximately 7.4% of the schoolchildren had low VA, considering the measurement in the best eye.

This study considered normal vision only in those individuals who presented 20/20 VA, and included those schoolchildren who wore glasses at the time of the assessment, unlike other studies, which exclude children who are already undergoing an ophthalmological treatment[12].

The classification in categories of visual impairment adopted by the WHO considers the corrected VA in the best eye to determine terminologies such as normal vision, low

vision (characterized according to the degree of visual loss), and blindness[5]. That said, when defining the schoolchildren' vision, there is a prevalence of low vision in 57.2% (n=95) of the total sample (n=166), 56.6% (n=94) with mild visual loss, and 0.6% (n=1) with moderate visual loss.

The urgent need for early and systematic assessments during visual development in childhood is evidenced, as refractive errors that are not corrected or inadequately corrected can lead to reversible or irreversible vision loss. This assessment is recommended in the school routine, where health and education professionals work to ensure adequate and timely visual treatment[18,19].

In addition, 94 (56.6%) of the guardians had already identified some difficulty or problem related to vision in their children and, accordingly, 100 (61%) children self-evaluated the quality of their vision negatively, which indicates that most of the guardians and children are aware of the situation and are able to identify and report visual complaints.

A study carried out in Santa Catarina[11] revealed that 47.3% of the children had low VA compatible with the negative self-perception of the quality of vision, which is close to the 61% (n=101) evidenced in this study. Other studies found that many schoolchildren have difficulty expressing their visual perception given the relatively high number of children who reported self-perceptions of normal vision among those with low VA and vice versa[9,20].

Self-perception of the quality of the vision is not a simple matter, due not only to the age of the children but also to the symptoms, which may be absent or confused with other clinical conditions as they include generic complaints such as headache and difficulty in reading, which may be frequently attributed by the teachers more to lack of interest than to a visual impairment in the student. Attention must be paid to the other signs and symptoms described in the literature, such as burning, lachrymation, squeezing, frowning, tilting of the head, restlessness, redness, strabismus, and blurred vision[20-22].

One of the PSE premises refers to health promotion activities and early detection of visual problems, involving students, teachers, family, the community, and health professionals in order to screen, that is, identify health needs, but also to ensure the treatment, which can be performed through the use of glasses, one of the most simple, common, and efficient interventions[23,24].

In the scope of primary care, nurses stand out in this process, either by having contact with children in their different phases of development, or even by providing guidance to the family members and caregivers to identify any sign of alterations[21,25]. The transformative approaches of nurses in eye care for schoolchildren are highlighted by associating eye screening with playful activities sensitive to the development of the children, such as the promotion of care through puppets and music, this being an innovation with respect to the traditional studies[26].

The implementation of programs for eye health and for the prevention of ophthalmological complications in developed countries presents unequaled lower costs than those represented for the treatment of patients with eye problems[4,10]. In this context, the use of charts adapted for A4 sheet size[8] in the eye health practices at school, or even of smartphone applications instead of the printed Snellen Chart, can be a low cost and practical alternative in carrying out the screening tests within the scope of PSE[27,28].

Public eye care services in Brazil are offered in accordance with the National Policy on Ophthalmology Care, whose network articulation aims at creating comprehensive care lines that encompass all the levels of care, in addition to promoting expanded access and coverage to the specialized services in ophthalmology[29].

It is worth highlighting that the FD has the highest eye specialist/inhabitants ratio in the country (1/5,195), according to the 2014 Ophthalmologist Census[30]. In spite of that, in this research 126 (75.9%) children have never had access to these services, whether public or private, and only 23 (13.9%) had an appointment with an ophthalmologist in 2018.

The high prevalence of low VA associated with limited access to public or private eye health services reveals the impact of social inequalities as regards offer and accessibility[14], as well as the failures in the continuity of eye care observed in schoolchildren who wear glasses. Prevention and screening of eye problems are fundamental steps in the eye health programs at school, as these practices are associated with access to and comprehensive eye care.

The study has internal validity justified by the robust systematics and evidenced by the findings on the target population; despite this, it has limitations regarding the sample population, restricted to a school of the FD, in addition to the high number of guardians who refused the invitation of the randomized participants, especially due to the absence of ophthalmological complaints from the children. These facts may have contributed to the selection of a larger portion of children with altered vision, which makes it impossible to generalize the results.

CONCLUSION

This study aimed at measuring the prevalence of low VA in students from a public school in the FD who, in most cases, never received any care (66.87%, n=111). It was evidenced that the guardians had already identified some vision difficulty or problem in their children and that, of the schoolchildren who wear corrective lenses, 11 (84.6%) had low VA even with the correction.

It is concluded that the high prevalence of low VA reveals gaps in the actions of prevention, early detection, and correction of eye problems in students from public schools in São Sebastião.

The need for new research studies is highlighted in order to identify the reality of the vision sense in schoolchildren from the other regions of the FD, a fundamental stage to support the planning of continuous, effective, and sensitive actions based on evidence for prevention and early detection of visual alterations during childhood.

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Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - LAF, MAHF