

Prevalence of visual disorders in school children

Prevalência de baixa acuidade visual em escolares

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ABSTRACT

Objective: To evaluate the epidemiological profile of visual acuity (VA) dysfunction, the possible ocular disorders and the frequency of ophthalmologic care of school children from the city of Itaúna, Minas Gerais, Brazil. **Methods:** A cross-sectional study with a population of 432 students in the public schools. The individuals were evaluated by the Snellen method and the sample age ranged from 4 to 17 years. Data were collected and systematized. Those who had $VA \leq 0.7$ in at least one eye were referred to the ophthalmology service. **Results:** Of the 432 students evaluated in this study, 14.5% presented low VA, when evaluated by the Snellen test. Of these, 61.9% were female. The age group with the highest prevalence of low vision were schoolchildren aged 15 to 17 years. The majority presented alteration in both eyes and 60% of the evaluated students stated that they had never had an ophthalmological consultation. Of the students who attended the consultations, most were diagnosed with refractive errors and needed optical correction. **Conclusion:** The results showed that a significant portion of the individuals evaluated had low vision and required ophthalmologic referral. In addition, there was no previous ophthalmological consultation in most of the schoolchildren. This fact reinforces to public health agencies, the need to implement visual screening systems in schools and offer assistance to these students, with the aim of improvements in their learning and quality of life

Keywords: Snellen Test; Visual acuity; Eye health; Vision disorders; Visual screening; School health; Child

RESUMO

Objetivo: Avaliar o perfil epidemiológico de disfunção da acuidade visual (AV), possíveis distúrbios oculares e a frequência ao atendimento oftalmológico, de escolares do município de Itaúna, Minas Gerais, Brasil. Posteriormente objetivou-se o encaminhamento ao especialista para correção das anormalidades. **Métodos:** Estudo transversal, com população avaliada de 432 alunos da rede pública de ensino. Os indivíduos foram avaliados pelo método Snellen e a faixa etária da amostra variou de 4 a 17 anos. Os dados foram colhidos e sistematizados. Foram encaminhados para o serviço de Oftalmologia aqueles que possuíam $AV \leq 0,7$ em pelo menos um dos olhos. **Resultados:** Dos 432 alunos avaliados neste estudo 14,5% apresentaram baixa AV, quando avaliados pelo teste de Snellen. Destes, 61,9 % pertenciam ao sexo feminino. A faixa etária em que houve maior prevalência de baixa visão foram escolares de 15 a 17 anos. A maioria apresentou alteração em ambos os olhos e 60% dos alunos avaliados declararam nunca terem passado por uma consulta oftalmológica. **Conclusão:** Os resultados encontrados demonstram que a parcela significativa dos indivíduos avaliados apresentou baixa visão e necessitou de encaminhamento oftalmológico. Além disso, observou-se a inexistência de consultas oftalmológicas anteriores em grande parte dos escolares. Esse fato reforça, diante dos órgãos públicos de saúde, a necessidade de implantar sistemas de triagem visual nas escolas e oferecer assistência a esses estudantes, objetivando melhorias em seu aprendizado e qualidade de vida.

Descritores: Teste de Snellen; Acuidade visual; Saúde ocular; Transtornos da visão; Triagem visual; Saúde escolar; Criança

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INTRODUCTION

Sight is mandatory in the development of the child during the first years of life. It is closely linked to learning and is responsible for most of the sensory information that the individual acquires from the external environment.⁽¹⁾

Ocular development occurs progressively from birth to 7 years of age, a period in which visual stimuli (light and shapes) are fundamental conditions for its effectiveness. When the eyes are deprived of the visual stimuli in the periods of its development, they stop developing or even regress. The individual then evolves to a condition of low visual acuity (VA).^(1,2)

The integrity of sight is essential for the child's learning. Upon entering school, intellectual and social skills are developed more intensely, and such skills are directly associated to psychomotor skills, cognitive development, and performance of self-care, locomotion, and communication activities.^(3,4)

Thus, the ideal age for the detection and treatment of ophthalmological impairments is between 0 and 6 years, when the visual development is completed. According to studies, the longer the delay for detection of visual impairments, the lower the chances of vision recovery. In addition, studies show that uncorrected refractive errors are the main cause of low VA among children in Brazil.⁽⁵⁻⁷⁾

Data published by the Brazilian Council of Ophthalmology estimate that in Brazil about 29 thousand children are blind due to ocular dysfunctions that could have been prevented or corrected at an early stage. However, the economic and social conditions can make it difficult for the child to have an ophthalmologic examination before entering school. Therefore, visual screening programs in schools are important because they fill this gap.^(8,9)

Ophthalmologic screening allows the detection of diseases and consequently the prevention of childhood blindness, and also allows to evaluate the profile of refractive errors in the population, being of great relevance from the point of view of public health. Visual disorders lead to costly damages to the State and society due to occupational, economic, social and psychological restrictions of these individuals⁽⁶⁾, and their detection and early treatment are of great value. The detection of visual problems in schoolchildren is a preventive approach that aims to prevent the development of the disease and improve school achievement and learning.^(4,10)

Thus, the present study aimed at evaluating the prevalence of low VA in schoolchildren of public schools in Itaúna, identifying and directing the students with low VA to the proper treatment.

METHODS

A cross-sectional study was carried out in a population of young students (between 4 and 17 years old) from public schools in Itaúna, Minas Gerais (MG). The sample consisted of 432 schoolchildren. The data was collected from June to August, 2016 through regular visits to Escola Estadual de Itaúna, Escola municipal Augusto Gonçalves, and Escola Estadual Leonardo Gonçalves Nogueira.

The eight researchers who collected the data were trained simultaneously by a licensed ophthalmologist, and they followed a pre-established protocol for data collection. The study was carried out with the prior authorization of the institutions and the legal guardians of students evaluated. In addition to the ophthalmologic

evaluation, a questionnaire was also applied inquiring previous ophthalmological appointments among the individuals studied, as well as the presence of pre-existing ophthalmological diseases and previous treatments. Students who did not submit the authorization to those responsible for the study were not included in the survey.

The following materials were used to measure VA: Snellen optometric scale, occluder card, exam chair, measuring tape, and booklet to write the results. The classrooms were used as the place for examination, with good lighting (in the afternoon between 1pm and 2pm) coming from the lateral windows to the person examined.

The scale was placed in such a way that it avoided reflection, and against a wall at a distance of five meters from the student. The preparation for the test was done collectively, that is, for all students in the classroom, and individually afterwards, so that there were no doubts. The examiner explained and demonstrated what he would do. He placed the child in the exam chair at a distance of 5 meters from the scale, and asked them to indicate the corresponding letter. The letters indicated were individually illuminated in the table by the remote control that was with the examiner. The child's eye was covered without being compressed, and the examiner was reminded that both eyes should be open, even when under the occluder. Students who were wearing corrective lenses at that moment should be tested with them.

The VA recorded was the one found on the lowest line of the Snellen optometric table in which the student made two or three mistakes while reading the letters. The medical referrals of the children who presented dysfunctions to the exam were sent to the school. The criteria for referral to the ophthalmologist were: values of visual acuity ≤ 0.7 on the Snellen scale in one or both eyes.

The ophthalmologic medical care was performed by three ophthalmologists who participated voluntarily in the research, receiving in their offices the individuals identified with low vision. When the need to wear/buy glasses was confirmed, they were donated by social entities.

RESULTS

The present study evaluated 432 students regularly enrolled in Escola Estadual de Itaúna, Escola Municipal Augusto Gonçalves and Escola Estadual Leonardo Gonçalves Nogueira. Of the students examined, 43.7% (n=189) were males and 56.2% (n=243) females, whereas the age of the group studied ranged from 4 to 17 years old. However, the majority of the individuals belonged to the age group of 4 to 8 years old, corresponding to 58.3% of the students evaluated. Of the 432 students evaluated in the present study, 14.5% (n=63) presented low VA (less than or equal to 0.7 in at least one eye) when evaluated by the Snellen test.

Figure 1 shows that 61.9% (n = 39) of the students identified as having low VA were female, corresponding to 16.04% of girls evaluated. Of the total boys, 12.69% (n=24) presented low VA, being in need of referral.

Regarding the age group, it was verified that 20% of 4-year-old children had visual impairment, whereas the 5-year-old schoolchildren had a percentage of low VA of 17.8%. In the age group of 6 years, a percentage found was 13.41%, whereas among 7-year-old children 8.69% presented impairments. This finding was similar to that found in the 8-year age group, in which the percentage was 9.67%. In the group of 9-12 year old students,

9.25% presented low VA. Among students aged 13 to 17, the percentage of low VA was 23.90%. The prevalence of low visual acuity by age group is shown in table 1.

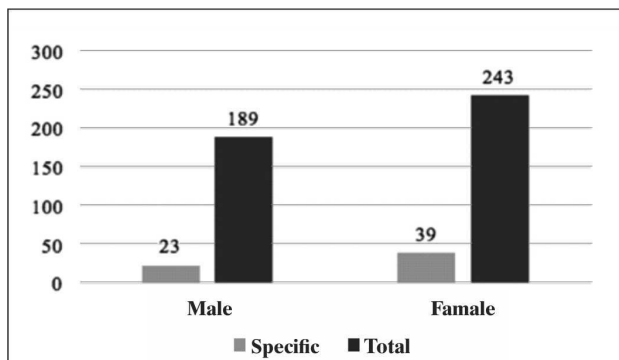


Figure 1: Frequency of low visual acuity by gender

Table 1
Prevalence of low visual acuity by age group

Age	Total sample		Children with low visual acuity NN	
	N		n	%
4 years	5		1	20.00
5 years	28		5	17.8
6 years	82		11	13.41
7 years	115		10	8.69
8 years	31		3	9.67
9-12 years	54		5	9.25
13-17 years	117		28	23.90
Total	432		63	14.5

Regarding ocular involvement, there was variation between the affected side (Table 2). Of the affected individuals, 23.8% (n=15) had low vision only in the right eye, 19.05% (n=12) only in the left eye, and 57.14% (n=36) in both eyes.

Table 2
Prevalence of ocular involvement

Involvement	N	%
Right eye	15	23.80
Left eye	12	19.05
Both	36	57.14

Of the students identified with low VA (n=63), only 25 legal guardians attended the meetings in the schools and all of them were referred to the ophthalmologist. The doctor appointments were provided free of charge thanks to a partnership with three ophthalmologists from Itaúna, and 16 students attended the appointments.

Of the students attending the appointments, 68.75% were identified with some type of refractive error, and more than 90% of them required optical correction. Regarding the diagnoses (Table 3), it was observed that 18.75% of individuals studied presented myopia, 25% presented astigmatism, 25% were diagnosed with both pathologies, 18.75% did not present significant alterations, and 12.5% were referred to the neurologist with possible diagnosis of attention disorder.

Table 3
Prevalence relation between diagnoses

Diagnosis	N	%
Myopia	3	18.70
Astigmatism	4	25
Myopia and Astigmatism	4	25
Referred to Neurology	2	12.50
Without alterations	3	18.75

Among the students examined, 91.2% (n=394) reported not wearing corrective lenses, whereas only 8.8% (n=38) reported wearing glasses prior to screening, and none reported wearing contact lens. Of the students examined, 4 had strabismus.

When asked about the frequency with which they are evaluated by ophthalmologists, 259 of the 432 students evaluated stated that they had never been to a previous ophthalmological appointment, 30 were examined less than one year ago, 121 more than one year ago, and 22 students did not respond to the questionnaire, as can be observed in figure 2.

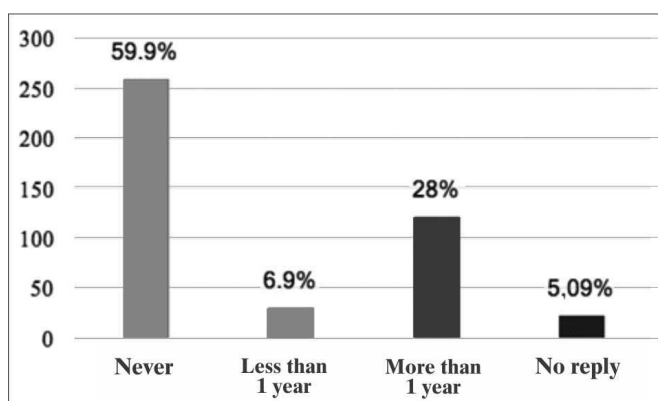


Figure 2: Frequência às consultas oftalmológicas dos escolares

DISCUSSION

Ophthalmologic evaluation and care of ocular problems should begin in childhood. The maturation of the visual system occurs until the eighth or tenth year of life approximately, with the first five years being the most important ones. In case correction is not done before this age, the occipital cortex adapts to the type of vision to which it is submitted, making the condition of low visual acuity of the child irreversible. Thus, the earlier the detection and correction of the problem occur, the better the future work capacity of that child.^(11,12)

According to Sociedade Brasileira de Oftalmologia Pediátrica, the first ophthalmologic exam (known as the red reflex testing) should be made still in the nursery by the pediatrician. After this evaluation, an examination is suggested every six months in the first two years of life, and then in cases of normality an annual examination up to 8-9 years of age.⁽¹³⁾

The frequency of low visual acuity found in the schoolchildren evaluated in the present study (14.5%) is in agreement with the findings of Granzoto and Collaborators. The researchers used the Snellen Scale to evaluate the visual acuity of 1502 schoolchildren from public schools of the city of Pelotas, Rio Grande do Sul. The exam showed that 15.1% of schoolchildren had low visual acuity in at least one eye.⁽¹⁴⁾

On the other hand, more divergent results were also found in studies conducted by Silva et al. and Neto et al., in the cities of Curitiba, Paraná, and Pouso Alegre, Minas Gerais. These studies found, respectively, 7.03% and 11.4% of children with low visual acuity, expressively lower results than the findings of the present study. Such discrepancy may be related to the population evaluated by both authors. Both studies evaluated a sample population much smaller than the one evaluated in the present study (201 and 242 schoolchildren, respectively), which could generate bias in the results obtained.^(15,16)

The high prevalence of low visual acuity among students aged 12 to 17 years (25%) found in the present study shows the Brazilian reality, in which the great majority of Brazilian school-age children have never undergone ophthalmologic examination⁽¹⁷⁾, being said finding convergent with the results obtained in the present study, where 60% of the students evaluated had never had ophthalmologic care.

In a similar study, Granzotto found similar results regarding the distribution of low visual acuity by gender. The prevalence found by Granzotto was 17% of low visual acuity in girls, and 13.3% in the boys evaluated. Moacir and colleagues also found similar results in a study carried out in 2003, where the prevalence was 23% for boys and 23.3% for girls. The highest number of students was females both in the present study and in the study by Moratelli Junior et al., which differs from the study of Granzotto in which the majority of students evaluated were males (51.5%).^(14,18)

Although studies show that amblyopia is the major responsible for the deficit in visual acuity during childhood accounting for up to 5% of children in the preschool stage⁽¹³⁾, children with this condition were not diagnosed in the present study, probably due to the low prevalence of the disease. Regarding the other ocular pathologies, Preslan and Novak and Lu et al. showed that the main ocular disorders found in students with low vision are refractive errors, in agreement with the results obtained in the present study.^(11,19)

Ophthalmologic disorders stand out as one of the most frequent causes of health problems among schoolchildren, and a close relation between visual problems and school performance can be observed.⁽¹⁵⁾ In a study involving 832 primary school students in Cali, Colombia, a significantly higher prevalence of visual disorders was found among repeaters when compared to non-repeater students, which indicates a relation between visual disorders and school achievement.⁽²⁰⁾

It is noted that the implementation of the programs to detect low visual acuity and prevent ophthalmological complications in developed countries has shown that the costs of these actions are incomparably lower than those represented by the care of patients with ocular disorders.

However, due to the socioeconomic and cultural factors of developing countries such as Brazil, less than 10% of the children who entered school had a previous ophthalmologic examination. In addition, data from Conselho Brasileiro de Oftalmologia (CBO) show that 20% of these students have some ocular disturbance.^(8,17) Exactly like in the city of Itaúna, where the public health system does not provide children with easy access to this exam, and does not offer specialized care to students with low VA.

CONCLUSION

The development of sight during the first years of life may present alterations that need to be corrected with appropriate

therapy during the early school years. The present study provided knowledge about the significant low VA rate in schoolchildren, of whom a considerable number had low VA. If untreated, this situation can generate negative consequences regarding learning and cognitive development of the children evaluated.

Low VA implies a restriction of the quality of life due to intellectual, social and psychological limitations. The implementation of visual screening programs has demonstrated high efficacy in the identification and early treatment of ophthalmic disorders, in addition to incomparably lower costs.

Authors' contributions

The authors Jessica Karinne Vieira; Gabriela Xavier Rezende had the same participation in creating and developing the present study.

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