ABSTRACT

**Purpose:** To analyze eye health and visual acuity in children and teenagers to promote early detection and treatment of visual impairments.

**Methods:** Public school students were pre-screened by teachers, and those who presented behavior, signs, or symptoms of decreased visual acuity (VA) or any other type of ophthalmological disorder, participated in a VA screening. The VA was registered for each eye, with or without optical correction. Children with VA less than or equal to 0.18 (logMAR) in the worst eye, and/or with complaints of asthenopia, eye irritation and itching, strabismus, conjunctival or corneal lesions were referred to the Ophthalmology Department of Celso Pierro Hospital for a complete ophthalmological evaluation.

**Results:** Fifty (52.63%) patients were male and 45 (47.37%) were female. The average age of the participants was 10 years. Their eyes were evaluated and 114 (77.03%) presented refractive errors; 7 (9.45%) of the patients who were referred to the clinic already wore prescription eyeglasses, and all of them had inappropriate refractive correction.

**Conclusion:** The most common refractive errors were: astigmatism in 94 (82.45%) children, myopia in 14 (9.72%) and hyperopia in 6 (4.16%). The conclusion is that there are not enough visual campaign and screening exams in public schools.

**Keywords:** eye health, health promotion, diagnosis, visual acuity, ocular refraction

INTRODUCTION

Visual impairment affects 7–25% preschool and school-aged children and is the third most common cause of health problems in school-aged children. Refractive errors (nearsightedness, farsightedness, astigmatism), strabismus, and amblyopia are the leading causes of visual acuity reduction in this population. As claimed by the Brazilian Council of Ophthalmology (CBO), 20% of students have an ophthalmologic abnormality (refractive error, amblyopia, conjunctivitis, strabismus, ocular sequelae accidents, congenital malformation, etc.). Ten percent of these students have refractive errors that need correction, with approximately 5% having severe visual acuity (VA) reduction (less than 50% of normal vision). According to the World Health Organization, about 7.5 million school-age children are visually impaired, but only 25% present symptoms, hence a detailed ophthalmologic examination is necessary to diagnose the majority of the cases.

Basic visual skills include the ability to use both eyes effectively and coordinate them to identify, recognize, and comprehend visual information. During their early school years, children perform recognition, association, and memory, exercises that require good visual discrimination ability. It has been estimated that as much as 85% of the learning a child does occurs through visual stimuli.

Early development visual ability may change frequently during the first school years, when the development of the visual apparatus occurs. Daily and prolonged contact between teachers and students allows for close observation of behavior, signs, and symptoms, of visual difficulties. One of the first manifestations of reduced visual acuity may be the lack of interest in reading or writing, since the child will not properly assimilate the visual information. In consideration of the importance of vision in the education and socialization of children and the high prevalence...
of visual disorders affecting children, the CBO, in partnership with the Brazilian Ministry of Education, developed a broad national campaign for eye health promotion called “Olho no Olho/ Veja bem Brasil” (1998). The project screened every first grade child living in cities with at least 40,000 inhabitants, and the needed prescription eyeglasses were donated. In 1999, the program reached 2.28 million children, and 256,815 pairs of glasses were provided. In 2000, 450,000 medical examinations were performed, and 300,000 glasses were provided.7

Early visual impairment detection aims to increase treatment resolution and prevent the damage children may suffer during development.8 Because multiple capabilities are mediated through vision, visual restriction will negatively interfere in the learning process and in the child’s overall development. In addition, the consequences of visual disturbances economically influence the nation owing to the occupational, social and psychological limitations of the affected individuals.9

The results of the Project “Olho no Olho/ Veja bem Brasil” motivated this research project, which aims to analyze the eye health and the visual acuity of children and adolescents in Campinas, SP, Brazil.

**SUBJECTS AND METHODS**

Public school students of Campinas were evaluated during the first semester of 2014. These children were pre-screened by teachers who then referred students presenting with behavior, signs, or symptoms of decreased visual acuity or any other type of ophthalmological disorder.

In the first phase, screenings were performed to evaluate the children’s visual acuity. The VA was registered for each eye with or without optical correction. Children with VA less than or equal to 0.18 (logMAR) in the worst eye (with or without optical correction) were referred for a complete ophthalmological evaluation. Children who complained of asthenopia, eye irritation and itching, strabismus, conjunctival and corneal lesions, were also referred to the Ophthalmology Department of Celso Pierro Hospital and Maternity (Catholic University of Campinas).

The following parameters were considered: sex; age; number of students who attended the pre-screening and also the following screening; number of students who were referred for the comprehensive evaluation; visual acuity with and without correction; number of students who were wearing glasses previously; number of students with asthenopia complaints who received eyeglasses prescription; prevalence of refractive errors; and other diagnose such as allergic conjunctivitis, ocular deviation, ptosis, stye, conjunctival nevus, keratoconus, and ocular trauma.

**RESULTS**

Two hundred and fifty nine (47.35%) out of 547 children referred by teachers attended the visual screening. The results of the following patients who had a complete ophthalmologic examination were: 58 (61.05%) children had low visual acuity; 33 (34.73%) children had other eye disorders (asthenopia, frequent ocular irritation, ocular deviation, corneal injury, and conjunctival injury); and 4 (4.21%) children were unable to provide reliable responses during the screening test. Seventy-four (77.89%) children had low visual acuity; 39 male (52.70%) patients and 35 female (47.30%) attended the ophthalmologic appointment. The abstention rate was 22.11%. The average age of the participants was 10 years (6–15 years). The average visual acuity was 0.30 (LogMAR).

One hundred and fourteen (77.03%) out of 148 eyes evaluated presented refractive errors. The average dynamic spherical equivalent refraction was +1.75 (ranged from -26.00 to +6.00) and the average ectatic spherical equivalent refraction was +5.54 (ranged from -15.75 to +7.50). Table 1 shows the frequency of the most common refractive errors in the examined population. Table 2 shows the frequency of the most common eye diseases in the examined population.

Strabismus was diagnosed in 2 (2.70%) children. Among the 18 children referred to the Ophthalmologic Clinic of asthenopia symptoms, 12 (66.67%) were diagnosed with refractive errors: 2 children presented myopia (prevalence of 16.67%), 8 compound myopic astigmatism (prevalence of 66.67%), and 2 had hyperopia (prevalence of 16.67%). All children who arrived at the clinic already using glasses, 7 (8.45%) had wrong prescriptions.

**DISCUSSION**

The evaluation of any potential eye ailment should be done early, as a greater delay in diagnosis leads to a lower chance of recovery. Furthermore, visual impairment contributes to low school performance and socialization.8,11 In the present study, 58 students presented low visual acuity (VA), representing 22.39% of the total sample (n = 259). The low AV frequency found is in agreement with the literature data, ranging between 11.9% and 25.8%.

According to Granzoto et al1 15.1% of students have low VA. Similar research reported rates of 20%,12 13.8%,13 22.5%,14 and 25.8%.15

Among the 148 eyes examined during the complete ophthalmologic appointment,


11. Kassio M. An exhaustive study of the frequency of vision disorders in chil-


Conclusão

Os mais comuns erros reflecionados nos exames de avaliação ocular realizados em escolas são: astigmatismo em 82.45% dos exames, hipermetropia em 14.97%, hipermetropia em 4.16% e miopia em 0.24%. A contribuição de estudos como este é fundamental para que o gestor de uma escola possa tomar as medidas para o bem-estar dos estudantes.