EARLY DETECTION OF AMBLYOPIA AT SCHOOL AGE BY VISUAL SCREENINGS

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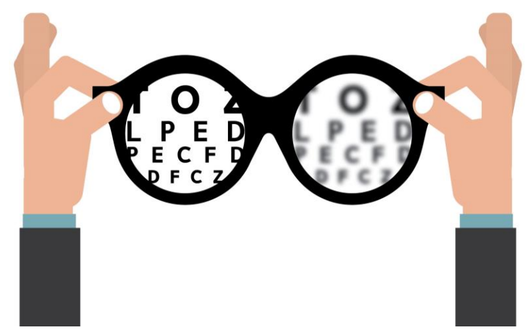
INTRODUCTION

Amblyopia is a disorder of visual development that begins in childhood. Is one of the most common causes of unilateral or bilateral vision loss without ocular pathology[1], which has a worldwide prevalence ranging from 0.2% to 6.2% in children[2]. Therefore, early detection and treatment is key to avoiding irreversible vision loss in the future and potential school problems resulting from the non-correction of refractive defects.



Previously, vision screening of preschool children has employed traditional methods based on subjective visual acuity to assess visual function, but new technologies, such as photorefraction, have promoted the preliminary detection of refractive defects in a quick and easy way in the early school years. These non-contact devices have the advantage that measurements can be taken at working distances of 1 meter and more suitable for examining small and uncooperative children[3,4].

PURPOSE The aim of this study is to determine the age prevalence of amblyopia and refractive errors using a photorefractor device in a pediatric population of several schools in the city of Madrid (Spain).

MATERIALS & METHODS

Fig. 1: Refraction measurement with PlusOptix A12R device (Plusoptix GmbH, Nuremberg, Germany) by optometrist.

PATIENTS

Cross-sectional study in which refractive data were collected from a population of children aged 4 to 12 years (mean ± SD, 7.98 ± 2.29). Thanks to the collaboration of AMIRES (association of Magna Myopia with Retinopathies), 10 schools in the city of Madrid were contacted. All students within the age range were invited to participate in a program for early detection of visual problems, based on a brief anamnesis and an automatic photorefraction. Optometrists measured the refraction of 1347 participants.

DATA COLLECTION

The anamnesis consisted of noting the age, sex of the children and whether they habitually used glasses. Binocular photorefraction was performed with the PlusOptix A12R instrument (Plusoptix GmbH, Nuremberg, Germany)[5,6,7] at one meter of distance by a trained optometrist (Figure 1). To improve the detection of the eye pupils during measurements, mesopic illumination conditions were maintained. Two consecutive measurements were taken per child to check repeatability; if they were differed by more than 0.50D, the measurements were taken again. Each measurement took 30 seconds and the total exam 5 minutes. Risk factors of the American Association for Pediatric Ophthalmology and Strabismus (AAOPS) were considered to determine the presence of amblyopia in children (Table 1). When refractive errors were not corrected, they were considered as no detected potential amblyopia.

STATISTICAL ANALYSIS

The refractive error of the subjects was studied as a function of the sphere, cylinder, axis and the potential probability of developing amblyopia due to their refraction. The results are shown in terms of percentage of subjects.

Risk factors according to the American Association for Pediatric Ophthalmology and Strabismus (AAOPS)[8]

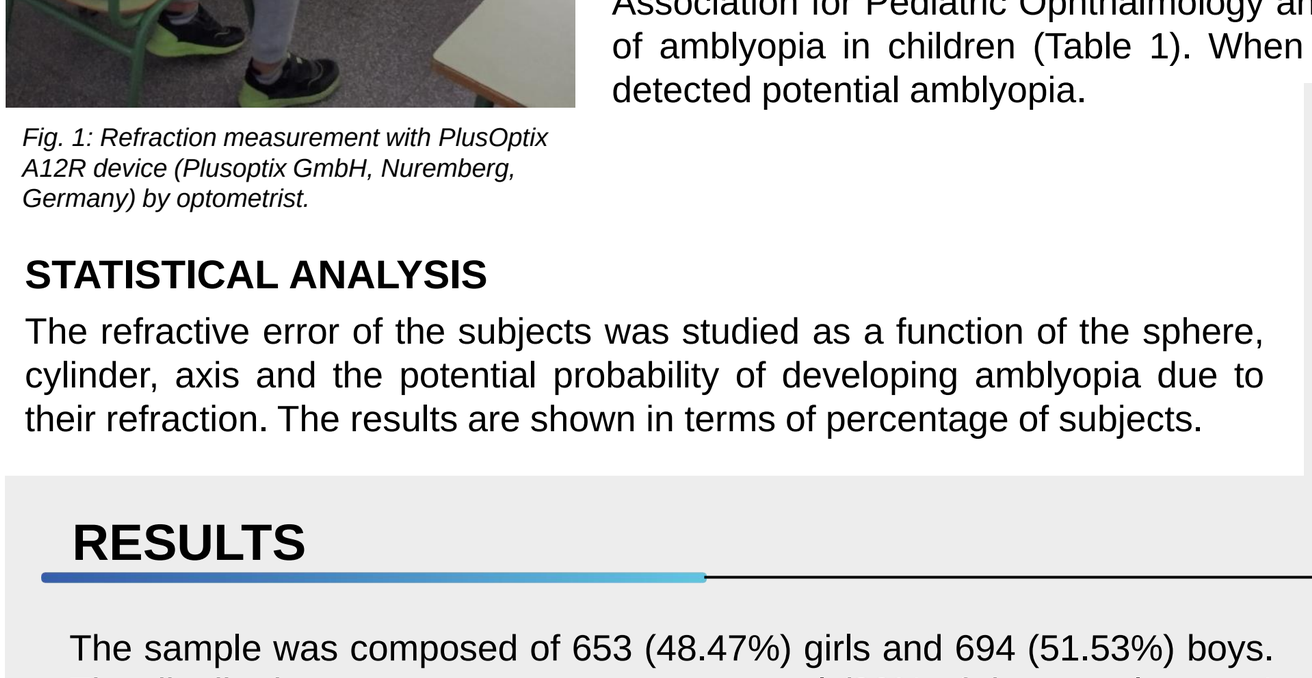
- Anisometropia > 1.5D
- Hyperopia > 3.5D
- Myopia < -3.0D
- Astigmatism > 1.5D @ 90±10º or @ 180±10º.
- Oblique astigmatism >1.0D

Table 1. Criteria used to determine the presence of amblyopia.

RESULTS

The sample was composed of 653 (48.47%) girls and 694 (51.53%) boys. The distribution among age groups was equal (30% of the sample was 4 to 6; 39%, 7 to 9; and 31%, 10 to 12).

Potential amblyopia was found around 20% of the population younger than 7 years old, while it was between 10 and 20% in the elder groups. According to AAPOS 3.9% of the total sample had anisometropia > 1.5D, 0.4% had hyperopia > 3.5D, 1.9% had myopia < -3.0D, 10.3% astigmatism > 1.5D @ 90±10º or @ 180±10º and 8.5% had oblique astigmatism >1.0D.



(a) (b)

Fig. 2: Distribution of spherical (a) and cylindrical (b) power as a function of age. The red lines establish the limits for the presence of amblyopia in children according to the AAOPS (Table 1).

Figure 3 shows the percentage of subjects with refractive errors, of subjects potentially amblyopic due to their refraction and of undetected subjects.
It was observed that the risk of amblyopia due to subjects' refractive errors decreases slightly over the age groups (19% 4 to 6, 17.5% 7 to 9, and 13.7% 10 to 12).

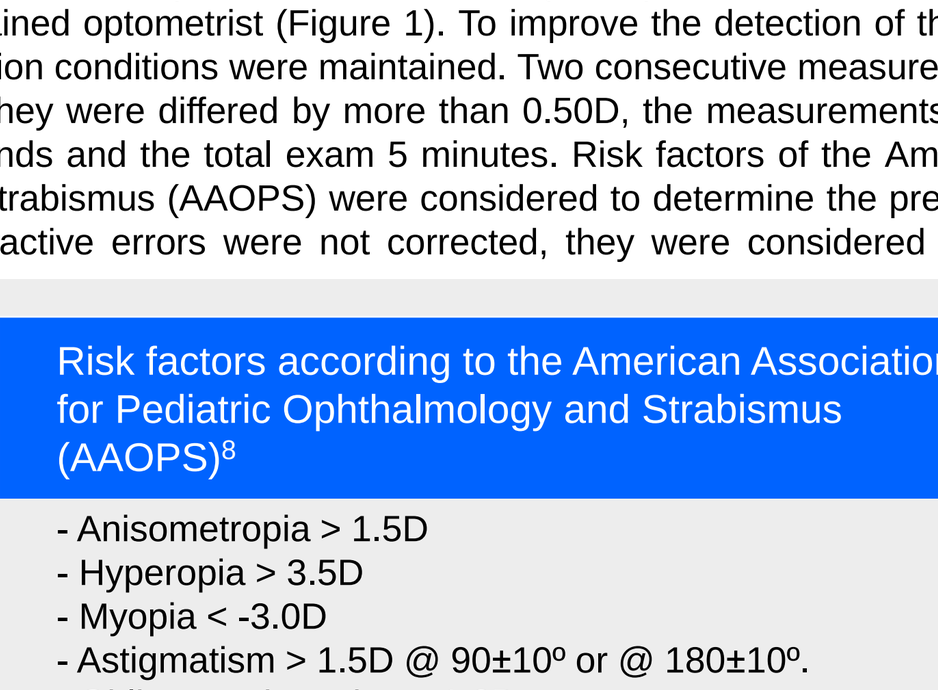


Fig. 3: Percentage of subjects with refractive errors (dark blue), potentially amblyopic (light blue) and uncorrected subjects (gray).

As a parameter of potentially amblyopic subjects who have not been identified, the number of uncorrected subjects was studied. It was found that 68% of potentially amblyopic subjects had not yet been identified. Again, the number of uncorrected subjects was found to decrease with increasing age (77% 4 to 6, 67% 7 to 9, and 56% 10 to 12).

CONCLUSIONS

The prevalence of uncorrected refractive errors is high among children, which in most cases leads to the development of amblyopia. These results show that it is necessary to reinforce school health programs to provide more information and better eye care services to improve this public health problem.

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