

Estrabismo, acuidade visual e erro refrativo não corrigido na criança em idade escolar

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There is no actual or potential conflict of interest in relation to this presentation.

Strabismus, Visual Acuity, and Uncorrected Refractive Error in Portuguese Children Aged 6 to 11 Years

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ABSTRACT

Introduction: Visual anomalies that affect school-age children represent an important public health problem. Data on the prevalence are lacking in Portugal but is needed for planning vision services. This study was conducted to determine the prevalence of strabismus, decreased visual acuity, and uncorrected refractive error in Portuguese children aged 6 to 11 years.

Methods and materials: A cross-sectional study was carried out on a sample of 672 school-age children (7.69 ± 1.19 years). Children received an orthoptic assessment (visual acuity, ocular alignment, and ocular movements) and non-cycloplegic autorefractometry.

Results: After orthoptic assessment, 13.8% of children were considered abnormal ($n = 93$). Manifest strabismus was found in 4% of the children. Rates of esotropia (2.1%) were slightly higher than exotropia (1.8%). Strabismus rates were not statistically significant different per sex ($p = 0.681$) and grade ($p = 0.228$). Decreased visual acuity at distance was present in 11.3% of children. Visual acuity $\leq 20/66$ (0.5 logMAR) was found in 1.3% of the children. We also found that 10.3% of children had an uncorrected refractive error.

Conclusions: Strabismus affects a small proportion of the Portuguese school-age children. Decreased visual acuity and uncorrected refractive error affected a significant proportion of school-age children. New policies need to be developed to address this public health problem.

Introduction

- Preventable visual loss in children is an important **public health problem**.¹
- The critical period of susceptibility to deprivation or abnormal visual experience has been identified since the early 1970s.²
- Preventable visual loss caused by **amblyopia** (0.3%–4%) and its risk factors such as **strabismus** (2.1%–4.6%) and **uncorrected refractive errors** (5%–7.7%) represent an important public health problem.^{1,4–11}



Introduction

- Thus the primary justification for preschool vision screening is the detection of amblyopia or amblyogenic refractive, strabismic, or ocular disease conditions.^{4,12}
- However in Portugal there has been little investigation regarding prevalence of visual anomalies among school-age children.
- Data on the prevalence are lacking but are needed for planning vision services.



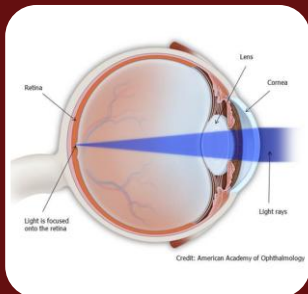
Aims



Determine the prevalence of strabismus.



Determine the prevalence of decreased visual acuity.



Determine the prevalence of uncorrected refractive error.

Methods and materials

- A cross-sectional study was performed between January and July of 2012.
- Data from 11 mainstream primary schools (out of a total population of 203 schools) in Lisbon, Portugal, have been examined for the present study.
- A **convenience sample** with **672** children (7.69 ± 1.19 years) of Portuguese origin was collected.
- This study adhered to the tenets of the Declaration of Helsinki.
- Informed consent was obtained from the parents to allow inclusion of their child's data in the study.

Methods and materials



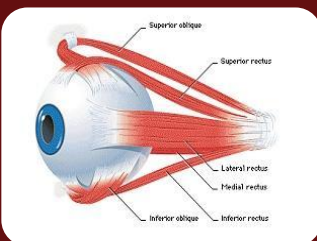
Refractive error was measured with non-cycloplegic auto-refraction - Sure Sight™ WelchAllyn autorefractometer (hyperopia $\geq +3.75$; myopia ≤ -0.75 D, astigmatism ≥ 1.75 D; anisometropia ≥ 2.75 D).¹⁴



Distance visual acuity was assessed with correction (3m) with a Sloan letter linear-spaced Good-Lite chart (abnormal visual acuity $< 20/25$ or different between the two eyes (2 lines)).¹⁵⁻¹⁷



Ocular alignment was assessed and measured with a prism cover test at 6 m and 33 cm. Manifest strabismus was defined as constant or intermittent tropia of any magnitude at distance or near fixation.⁶



Ocular movements (versions and ductions) were assessed with a pen light in the 9 cardinal positions.

Results

- After orthoptic assessment, 13.8% of children were considered abnormal (n=93) and 54.84% of these children were without optical correction (n=51).

TABLE 1. Distribution of the children by grade, age, and sex.

| Grade | n | % | Age (years) | | Sex n (%) | |
|-----------|-----|------|--------------------------------|-------|------------|------------|
| | | | Average and standard deviation | Range | F | M |
| 1st grade | 158 | 23.5 | 6.17 ± 0.38 | 6–7 | 87 (55.1) | 71 (44.9) |
| 2nd grade | 170 | 25.3 | 7.26 ± 0.45 | 6–8 | 83 (48.8) | 87 (51.2) |
| 3rd grade | 179 | 26.6 | 8.11 ± 0.46 | 7–11 | 97 (54.2) | 82 (45.8) |
| 4th grade | 165 | 24.6 | 9.14 ± 0.69 | 8–11 | 95 (57.6) | 70 (42.4) |
| Total | 672 | 100 | 7.69 ± 1.19 | 6–11 | 362 (53.9) | 310 (46.1) |

- **Manifest strabismus** was present in 27 children (4%) and **decreased visual acuity** at distance was present in 76 children (11.3%).
- 69 children had an **uncorrected refractive** error (10.3%).

Results: prevalence of strabismus

TABLE 2. Manifest strabismus.

| Cover test | Wearing glasses | | n | % | Magnitude at near | | Magnitude at distance | |
|-----------------------------------------|-----------------|----|----|-----|-------------------|-------|-----------------------|-------|
| | Yes | No | | | Median (PD) | Range | Median (PD) | Range |
| Excess type/near esotropia | 8 | 0 | 8 | 1.2 | 20 | 6-30 | 17 | 6-25 |
| Near esotropia equal to distance | 4 | 2 | 6 | 0.9 | | | | |
| Intermittent exotropia greater for near | 1 | 6 | 7 | 1.0 | 16 | 4-25 | 10 | 4-20 |
| Divergent excess type | 1 | 2 | 3 | 0.4 | | | | |
| Basic exotropia | 1 | 1 | 2 | 0.3 | | | | |
| Hypertropia | 0 | 1 | 1 | 0.1 | 10 | 10 | 10 | 10 |
| Total | 15 | 12 | 27 | 4.0 | - | - | - | - |

- We found out slightly higher rates of esotropia (2.1%) and lower rates of exotropia (1.8%), although this finding was not statistically significant.
- Of those with horizontal strabismus, 9 had coexisting vertical heterotropia.
- Six esotropic children had uncorrected refractive error (3 **hypermetropia**, 1 astigmatism, 2 anisometropia). One child with exotropia had uncorrected **anisometropia**.

Results: prevalence of strabismus

- **Ocular movements** were abnormal in 1.9% of the children (n = 13); all presented manifest strabismus.
- Strabismus rates were **slightly higher for girls** (2.5%) than for boys (1.5%), although this finding was not statistically significant (p=0.681).



- Strabismus was less frequent in children in the 1st (n=5) or 2nd grade (n=3).
- For older children, the prevalence rates were higher (3rd grade, n=12, and 4th grade, n=7). However this finding was not statistically significant (p=0.228).

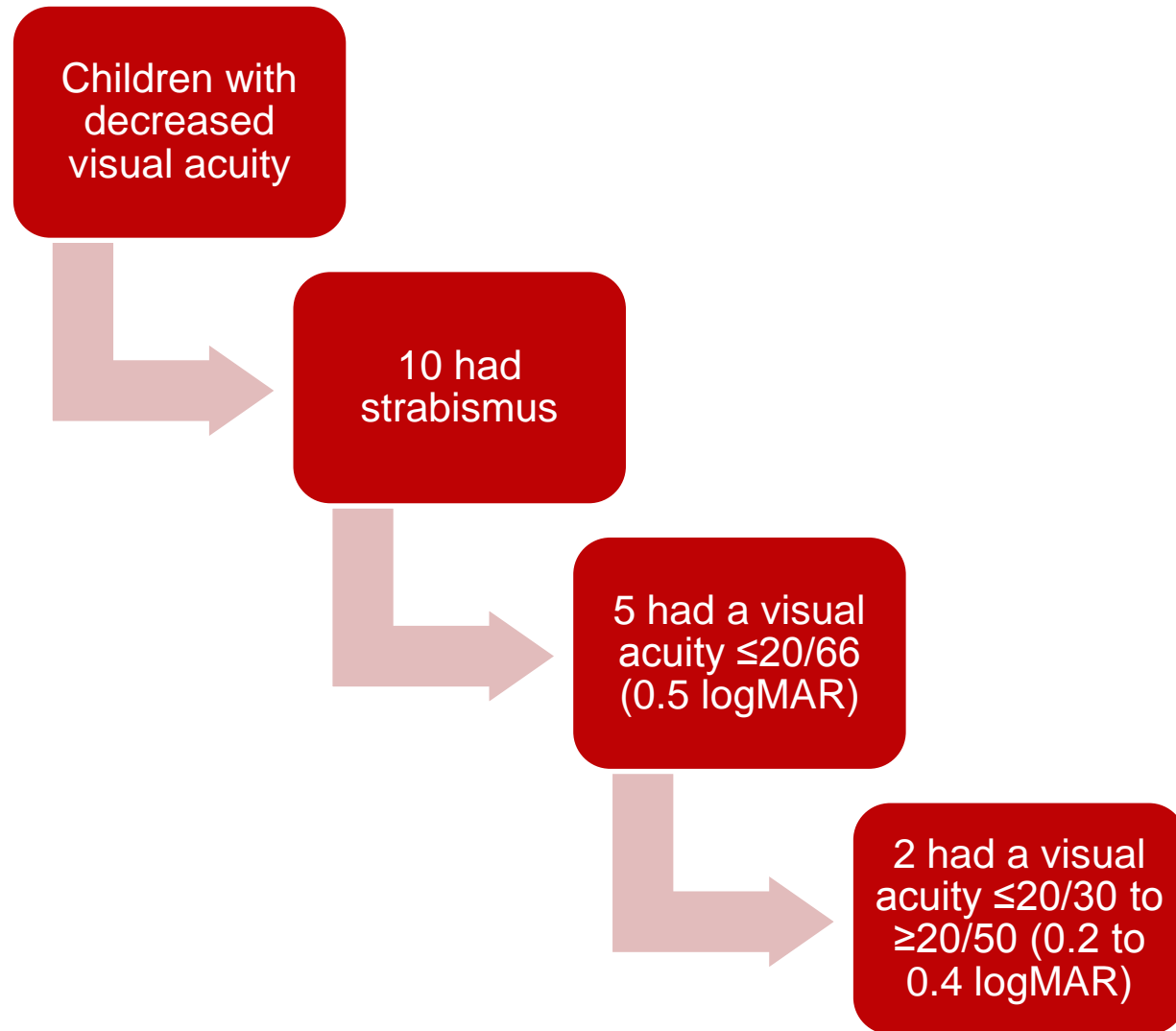
Results: Prevalence of decreased visual acuity

TABLE 3. Distribution of visual acuity and uncorrected refractive error.

| Visual acuity | n (%) | n (%) | | Uncorrected refractive error – n (%) | | |
|--------------------------------------|------------|-----------------|-----------------|--------------------------------------|-------------|---------------|
| | | Wearing glasses | Without glasses | Hyperopia | Astigmatism | Anisometropia |
| ≥20/25 (0.1 logMAR) | 596 (88.7) | 101 (75.9) | 495 (91.8) | 44 (80.0) | 2 (22.2) | 2 (40.0) |
| <20/25 (0.1 logMAR) | 44 (6.5) | 17 (12.8) | 27 (5.0) | 11 (20.0) | 7 (77.8) | 3 (60.0) |
| ≤20/30 to ≥20/50 (0.2 to 0.4 logMAR) | 35 (5.2) | 12 (9.0) | 9 (1.67) | 7 (12.7) | 6 (66.7) | 1 (20.0) |
| ≤20/66 (0.5 logMAR) | 9 (1.3) | 5 (3.8) | 1 (0.19) | 2 (3.6) | 0 (0) | 1 (20.0) |
| Interocular difference of 2 lines | 32 (4.8) | 15 (11.3) | 17 (3.15) | 2 (3.6) | 1 (11.1) | 1 (20.0) |
| Total | 672 | 133 | 539 | 55 | 9 | 5 |

- Decreased visual acuity at distance was present in 76 of 672 children evaluated (11.3%).
- A visual acuity inferior to 20/25 (0.1 logMAR) was found in the right eye in 31 children and in the left eye in 34 children. In 32 children an interocular difference of 2 lines was found.
- Thirty-five children (5.2%) had a visual acuity ≤20/30 to ≥20/50 (0.2 to 0.4 logMAR) and nine (1.3%) had a visual acuity ≤20/66 (0.5 logMAR).

Results: Prevalence of decreased visual acuity



Results: Prevalence of uncorrected refractive error

TABLE 3. Distribution of visual acuity and uncorrected refractive error.

| Visual acuity | n (%) | n (%) | | Uncorrected refractive error – n (%) | | |
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- The prevalence of uncorrected refractive error measured with non-cyclopegic autorefraction was 10.3% (n=69).
- Of the children with an uncorrected refractive error, 55 (8.2%) had hyperopia, 9 (1.3%) had astigmatism and 5 (0.7%) had anisometropia.
- Of the children with visual acuity <20/25 (0.1 logMAR), 17 were wearing glasses, 11 had an uncorrected hyperopia, 7 had an uncorrected astigmatism, and 3 had an uncorrected anisometropia.

Discussion

- **Prevalence of manifest strabismus** is in accordance with other studies, who have reported a prevalence of 2.1%–4.6%.^{6–9}
- Our findings of **higher rates of esotropia** than exotropia are comparable with previous reports.^{7,8} However, other studies found nearly equal rates.⁶
- A lower rate of esotropia could be due to a earlier detection of an intermittent esotropia with provision of hypermetropic glasses.⁶
- **Reduced visual acuity** was the most prevalent anomaly (11.3%). Laatikainen and Erkkilä⁹ found a similar rate of decreased visual acuity (<20/25) with a prevalence of 13.4%.

Discussion

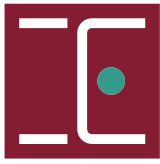
- Our findings also demonstrate that visual acuity $\leq 20/66$ (0.5 logMAR) was found in 1.3% of the children. Kvarnstrom, Jakobsson, and Lennerstrand⁷ found a lower prevalence of 0.2%.
- The **difference in prevalence** could be attributed to the different health systems. The Swedish screening is more frequent, which leads to an early treatment of amblyopia.⁷
- The major uncorrected refractive error found was hyperopia ($\geq +3.75D$), with a prevalence of 8.2%. Of those children 20% had a visual acuity $< 20/25$ (0.1 logMAR).
- Many children with mild refractive errors (hyperopia 2–4D) may not have reduced visual acuity and therefore go unnoticed.⁷

Discussion: limitations

- There are several limitations to our prevalence estimates. To determine prevalence rates in children a randomly selected study population of sufficient size is needed.
- One potential weakness of this study is the unknown representativeness of the study population.
- Visual acuity was tested using a linear spaced chart rather than a proportionally spaced chart. However, we converted the values into a LogMAR score.
- We also do not used best-corrected visual acuity and thus do not report amblyopia rates.

Conclusions

- In conclusion, strabismus affects a small proportion of Portuguese school-age children.
- The prevalence of strabismus was not significantly different when comparing children by sex and grade.
- Decreased visual acuity and uncorrected refractive error affected a significant proportion of school-age children.
- The authors can conclude that these results add to the body of information required for implementing vision screening strategies.
- New policies need to be developed to address this public health problem.



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Thank you for your attention!

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