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A Hospital-Based Study on Amblyopia Prevalence in Children Under 10 with Congenital Ptosis

Dr. Shanmathy[1], Dr. Indhuja[2]

Department of Ophthalmology, SRM Medical College Hospital, Trichy.

Email ID: drshanmathy@gmail.com

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Abstract

Background: Congenital ptosis is a birth defect characterized by a drooping upper eyelid, evident at birth or soon after. This condition is associated with abnormalities in the elevator muscle and neural dysfunction. The occurrence rate of congenital ptosis falls between 0.18% and 1.41%. It may be linked to various eye-related issues such as refractive errors, strabismus, or obstruction of the visual axis, potentially resulting in amblyopia.

Methods: Researchers conducted a forward-looking, cross-sectional investigation involving 50 pediatric patients under 10 who were diagnosed with congenital ptosis. The study took place at a tertiary healthcare facility between January and December 2022. The research team gathered and encoded the data, subsequently analyzing it using SPSS version 27. They employed both descriptive and inferential statistical methods, considering p-values below 0.05 as statistically significant.

Results: The study included 50 participants with an average age of 6.95 ± 2.12 years, evenly split between males and females. Unilateral ptosis was observed in 36 (72%) individuals, while 14 (28%) exhibited bilateral ptosis. Amblyopia affected 45% of the cases. Refractive error was the leading cause of amblyopia (60%), followed by deprivation (18%), strabismus (14%), and a combination of factors (9%). A statistically significant correlation was found between congenital ptosis and amblyopia ($p < 0.001$).

Conclusion: Thoroughly assessing children with congenital ptosis is vital for detecting factors that may lead to amblyopia. Timely action, including correcting refractive errors and performing surgical procedures, plays a crucial role in successfully rehabilitating vision.

Keywords: Hospital-Based Study, Amblyopia, Prevalence, Congenital Ptosis

Introduction

Upper eyelid drooping, known as congenital ptosis, is a condition that manifests at birth or during early childhood. This disorder primarily stems from myogenic or neurogenic issues, such as inadequate levator muscle performance, congenital third nerve paralysis, or Horner syndrome. Worldwide, the occurrence of congenital ptosis is believed to fall between 0.18% and 1.41% [1,2]. This ailment is linked to an elevated likelihood of visual problems, particularly amblyopia, which can hinder normal visual growth and development.

"Lazy eye," or amblyopia, occurs when the brain suppresses visual input from one eye to prevent double vision. Children with congenital ptosis may develop amblyopia due to refractive errors, visual axis obstruction from a drooping eyelid, or strabismus. Studies show that amblyopia affects 14–48% of

congenital ptosis cases [3,4]. This condition substantially affects quality of life, visual acuity, and binocular vision, highlighting the importance of early detection and treatment [5,6].

The objective of this research was to explore the occurrence of amblyopia among children affected by congenital ptosis and to analyse the elements that contribute to its onset. Through identifying these relationships, the study aimed to underscore the necessity for early detection, treatment, and rehabilitation efforts.

Materials and Methods

Study Design and Setting

This hospital-based prospective cross-sectional study was conducted in the Ophthalmology Department of a tertiary care center from January to December 2023. Ethical approval was obtained from our institutional review board.

Participants

The study included 50 children under 10 years old who were diagnosed with congenital ptosis. Patients with acquired ptosis, previous eye surgery, or systemic conditions affecting vision were excluded from the study.

Procedures

- Every subject underwent a thorough eye examination, which consisted of the following components:
- Vision Testing: A Snellen chart was utilized to determine the best-corrected visual acuity (BCVA). Amblyopia was identified when there was a difference of two or more lines in BCVA between eyes, or if the affected eye had a BCVA below 6/60.
- Droopy Eyelid Assessment: Measurements were taken for margin reflex distance 1 (MRD1), levator muscle function, and the height of the upper eyelid crease. The condition's severity was classified as mild (MRD1 between 2-3 mm), moderate (MRD1 between 1-2 mm), or severe (MRD1 of 0 mm or less).
- Refractive Error Evaluation: Cycloplegic refraction was conducted using 1% cyclopentolate. Refractive errors considered amblyogenic included anisometropia (1 dioptre or more), astigmatism (1 dioptre or more), hypermetropia (4 dioptres or more), and myopia (6 dioptres or more).
- Eye Alignment Check: The cover test was employed to assess ocular alignment.

Data Collection and Analysis: Microsoft Excel was utilized for data entry, while SPSS version 27 was employed for analysis. The results are presented as frequencies and percentages in descriptive statistics. To evaluate associations, the chi-square test was applied, with a significance threshold established at $p < 0.05$.

Results

Demographics

The research involved 50 children with an average age of 6.95 years (SD = 2.12) and an age range from 2 to 10 years. There was an equal split between genders, with 25 boys and 25 girls, each representing 50% of the sample. Over half of the participants (62%) were at least 5 years old.

Table 1: Age Distribution

Age Group	Frequency	Percentage
< 5 years	20	40%
≥ 5 years	30	60%

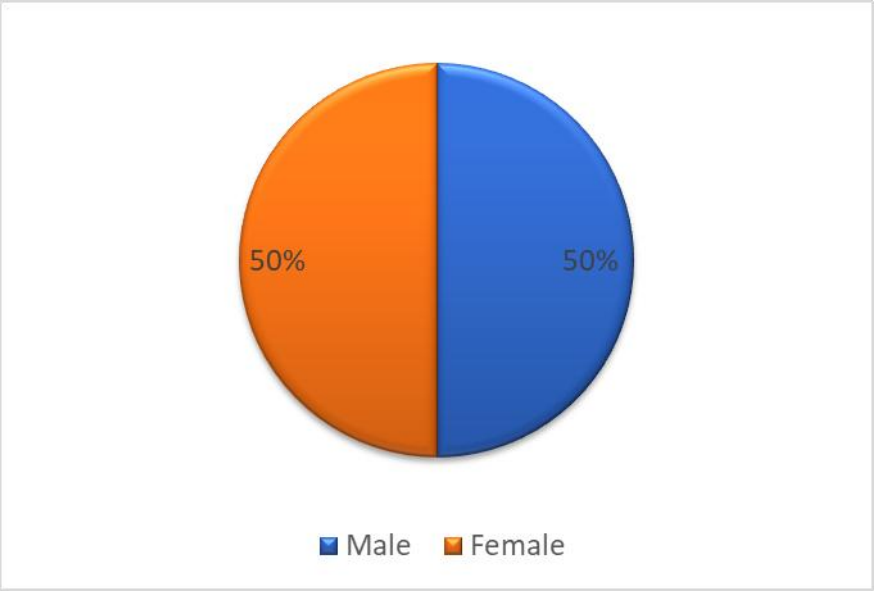

Chart 1: Gender Distribution

The study population consisted of an equal number of men and women, with 25 (50%) participants from each gender.

Table 2: Types of Congenital Ptosis

Type	Frequency	Percentage
Simple Ptosis	20	40%
Blepharophimosis	11	22%
Fibrosis Syndrome	9	18%
Third Nerve Palsy	8	14%
Mono-Elevation Deficit	2	4%

Single-sided ptosis affected 36 patients (72%), while 14 patients (28%) experienced the condition in both eyes.

Table 3: Causes of Amblyopia

Cause	Frequency	Percentage
Refractive	30	60%
Deprivation	9	18%
Strabismus	7	14%
Mixed	4	8%

Refractive Amblyopia (60%): The most prevalent cause arises from significant differences in refractive power between the eyes, such as astigmatism, hypermetropia, or myopia.

Deprivation Amblyopia (18%): Caused by obstruction of the visual axis due to ptosis, leading to reduced visual stimulation.

Strabismic Amblyopia (14%): results from misaligned eyes in which the brain suppresses input from

one eye to avoid double vision.
Mixed Amblyopia (8%): A combination of refractive errors, deprivation, and strabismus.

Table 4: Association Between Ptosis Severity and Amblyopia

Severity	Amblyopia Present	Amblyopia Absent	Total
Mild	5	10	15
Moderate	7	13	20
Severe	8	7	15

Among participants with amblyopia, the severity of ptosis played a significant role. Severe ptosis cases demonstrated a higher prevalence of amblyopia than mild or moderate ptosis cases.

Statistical Significance: The association between congenital ptosis and amblyopia was statistically significant ($P < 0.001$). Refractive errors were the leading amblyogenic factor, followed by deprivation caused by severe ptosis.

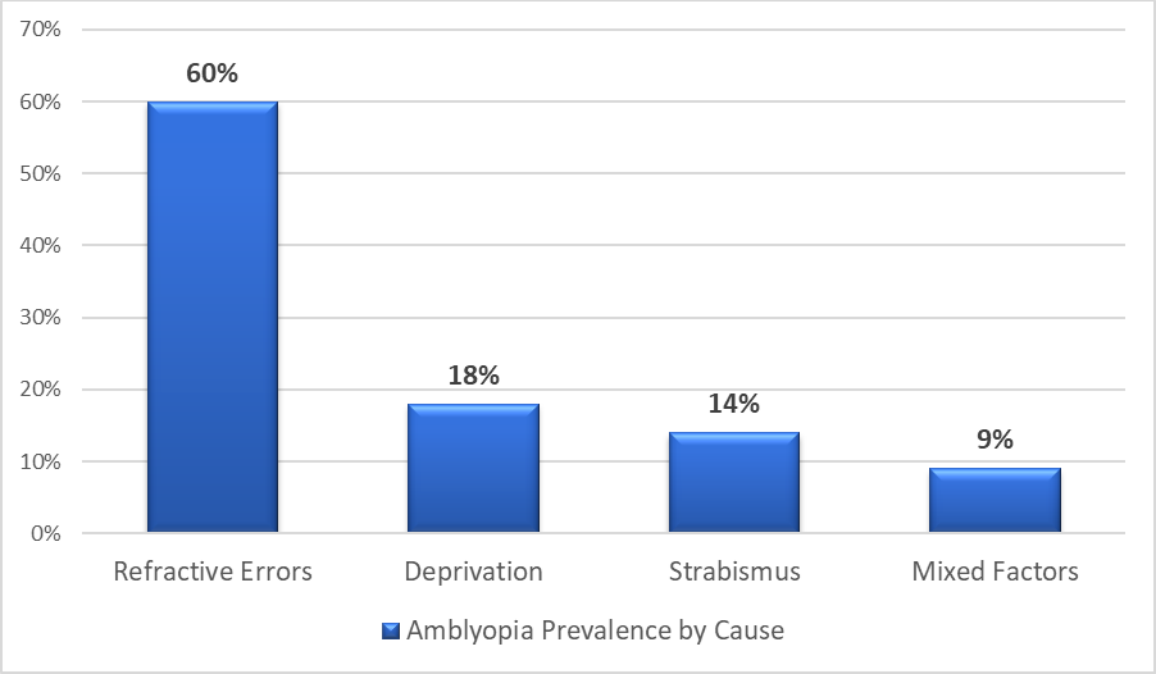

Chart 2: Amblyopia Prevalence by Cause

The distribution of causes among the study participants showed that refractive errors accounted for the majority at 60%, followed by deprivation in 18% of cases and strabismus in 14%. Mixed factors contributed to 9% of the cases. This indicates that refractive errors were the leading cause, highlighting the importance of early detection and correction of visual defects to prevent further complications.

Visual Outcomes

A portion of study participants experienced enhanced visual acuity following interventions involving refractive correction and surgical procedures. These results highlight the critical nature of early detection and intervention in eye care.

Discussion

This study found that 40% of children with congenital ptosis had amblyopia, which is consistent with earlier reports documenting prevalence rates ranging from 14% to 48% (Griepentrog et al. [3],

Schneider et al. [7]). Refractive error emerged as the predominant contributing factor, accounting for 60% of amblyopia cases. This finding is in agreement with studies by Oral et al. [4], who reported refractive amblyopia in 71% of cases, and Paik et al. [5], who observed similar refractive patterns. These findings highlight the importance of early detection and timely correction of refractive errors to reduce the risk of amblyopia in children with congenital ptosis.

In the present study, 18% of children were found to have deprivation amblyopia. Obstruction of the visual axis by the drooping eyelid is a recognized mechanism, although the risk may be partially mitigated by compensatory behaviors such as chin elevation and head tilt. Similar observations have been reported by Griepentrog et al. [3] and Hornblass et al. [11], who emphasized the protective role of these compensatory postures in reducing visual deprivation.

Strabismus was identified as the underlying cause of amblyopia in 14% of cases. Strabismus interferes with normal binocular vision development, leading to suppression of the deviating eye and subsequent amblyopia. The association between congenital ptosis, strabismus, and amblyopia has been previously explored by Schneider et al. [7] and Srinagesh et al. [6], supporting the findings of the present study.

The relationship between the severity of ptosis and the development of amblyopia remains controversial. While studies by Merriam et al. [8] and Hornblass et al. [11] reported a direct association between increased ptosis severity and higher amblyopia risk, other investigations by Stein et al. [13] and Beneish et al. [9,15] found no significant correlation. In the present study, children with severe ptosis demonstrated a higher incidence of amblyopia, lending support to studies that suggest ptosis severity plays a contributory role.

Additionally, 10% of cases demonstrated a mixed etiology of amblyopia involving refractive errors, strabismus, and visual deprivation. These complex presentations necessitate comprehensive ophthalmic evaluation and individualized management strategies. Previous studies by Lin et al. [12,17] and Ugurbaş et al. [10,18] have emphasized the importance of timely surgical correction of ptosis and its favorable impact on amblyopia treatment outcomes.

Conclusion

This research emphasizes the widespread occurrence of amblyopia in children with congenital ptosis, emphasizing how refractive error, deprivation, and strabismus contribute significantly to its onset. Timely detection and treatment are crucial to prevent permanent visual deficits. Thorough eye examinations, including measurements of ptosis, assessments of refractive errors, and correction of strabismus, are vital for properly managing these cases. Post-operative visual rehabilitation is critical in maximizing visual outcomes and enhancing quality of life. Managing congenital ptosis necessitates a collaborative approach involving eye specialists, pediatrician, and vision rehabilitation experts. Subsequent studies should examine long-term visual results and the effects of early surgical intervention in larger patient groups.

Conflict of interest: Nil

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