

Original Research Article

PREVALENCE OF REFRACTIVE AMBLYOPIA AMONG CHILDREN AGED 5-12 YEARS ATTENDING A TERTIARY CARE CENTRE IN SOUTH INDIA

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ABSTRACT

Background: Amblyopia is a leading cause of preventable visual impairment in children, most commonly resulting from uncorrected refractive errors. Early detection and correction during the visual developmental period are essential to prevent permanent visual loss. The aim and objective is to determine the prevalence and pattern of refractive amblyopia and its association with demographic and refractive factors among children visiting tertiary care centre in South India.

Materials and Methods: A cross-sectional study was conducted among 526 children aged 5-12 years visiting tertiary care centre in South India between July 2024 and June 2025. All children underwent Visual acuity assessment, cycloplegic refraction, and ocular examination. Children with amblyopia secondary to refractive error were identified and categorized by type, laterality, and refractive error pattern. Statistical analysis was done using chi-square tests to assess associations.

Results: The prevalence of refractive amblyopia was 5.9%. The majority of affected children were aged 5-7 years (48.4%), with no significant gender difference ($p = 0.67$). Anisometropic amblyopia (67.7%) was more common than isometropic (32.3%), and unilateral cases (71%) predominated. Hypermetropia (48.4%) was the most frequent refractive error associated, followed by astigmatism (29%) and myopia (22.6%). Younger age, anisometropia, unilateral involvement, and hypermetropia showed significant associations ($p < 0.05$).

Conclusion: Refractive amblyopia is a significant cause of visual morbidity among children. Anisometropia and hypermetropia are major contributing factors. Early vision screening and prompt refractive correction are vital to prevent long-term visual impairment.

Keywords: Refractive amblyopia, anisometropia, hypermetropia, prevalence, South India.

INTRODUCTION

Amblyopia, also known as "lazy eye," is a neurodevelopmental visual condition characterized by decreased best-corrected visual acuity in one or both eyes with no obvious anatomical abnormality. It is most commonly caused by uncorrected refractive problems, strabismus, or visual deprivation.^[1] Amblyopia affects approximately 1-6% of children

worldwide.^[2] In India, the frequency varies from 1.1% in Southern India,^[1] to 2.5% in Bhopal,^[4] and up to 9.1% in rural Telangana.^[5] Refractive amblyopia remains the most prevalent subtype, with anisometropia accounting for the majority of the contribution.^[3,6-8] Early screening and correction of refractive errors among children are crucial to prevent permanent visual impairment and improve ocular health outcomes in the paediatric population of South India.

Aims and Objectives

1. To estimate the prevalence of refractive amblyopia among children aged 5-12 years visiting tertiary care centre in South India
2. To identify and analyze the factors associated with refractive amblyopia, including types of refractive errors, age, gender, and other potential risk determinants.

MATERIALS AND METHODS

This cross-sectional study was conducted among children aged 5-12 years visiting tertiary care centre in South India between July 2024 and June 2025. Ethical clearance was obtained from the Institutional Ethics Committee before data collection.

The sample size was calculated using an expected prevalence of refractive amblyopia of 6.6 % (6), an absolute precision of 3%, and a 95% confidence level. After applying a design effect of 2, the final sample size was estimated to be 526. A multistage sampling technique was used— In the first stage, all three units were included. In the second stage, the number of participants from each unit was determined using probability proportional to size (PPS) based on the average patient load of each unit. Within each OPD session, eligible participants were selected using systematic random sampling from the registration list until the required sample size was achieved. Screening was conducted using Snellen's and near vision charts, a retinoscope, autorefractor, and ophthalmoscope. Cycloplegic refraction with 1% cyclopentolate was performed when necessary. Refractive amblyopia was diagnosed when visual acuity failed to improve with proper refractive correction in the absence of structural ocular defects. Children with refractive error-related amblyopia were included, while those with strabismic or deprivation amblyopia, other ocular diseases, neurological or developmental visual disorders, were excluded. Informed consent from accompanying care giver were obtained, and all data were collected confidentially by the same investigator.

RESULTS

Among the total 526 children included in our study, the prevalence of refractive amblyopia was found to be 5.9% [Figure 1]. The distribution of refractive amblyopia cases across age groups showed that 15 (48.4%) were in the 5–7 years age group, 11 (35.5%) in 8-10 years, and 5 (16.1%) in >10 years. Regarding gender, 17 (54.8%) were males and 14 (45.2%) were females.

Compared to isometropic amblyopia (10; 32.3%), anisometropic amblyopia was more prevalent (21; 67.7%). Regarding laterality, bilateral involvement was observed in 9 cases (29.0%), whereas unilateral involvement was observed in 22 cases (71.0%). The most common kind of refractive error was hypermetropia (15; 48.4%), which was followed by astigmatism (9; 29.0%) and myopia (7; 22.6%).

The prevalence of refractive amblyopia was significantly higher among children aged 5–10 years ($p = 0.024$). Anisometropic amblyopia (8.5%), unilateral involvement (7.7%), and hypermetropia (8.2%) were also significantly associated with refractive amblyopia ($p < 0.05$). Gender showed no significant association ($p = 0.67$). These findings implies that younger age, anisometropia, unilateral cases, and hypermetropic errors are key risk factors associated with refractive amblyopia.

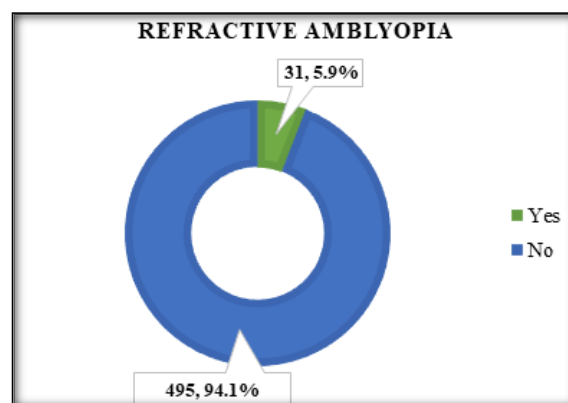


Figure 1: Prevalence of Refractive Amblyopia.

Table 1: Frequency Distribution of Refractive Amblyopia (n = 31)

Variable	Frequency n(%)
Age group (years)	
5–7	15 (48.4)
8–10	11 (35.5)
>10	5 (16.1)
Gender	
Male	17 (54.8)
Female	14 (45.2)
Type of Amblyopia	
Isometropic	10 (32.3)
Anisometropic	21 (67.7)
Laterality	
Unilateral	22 (71.0)
Bilateral	9 (29.0)
Refractive Error Type	
Myopia	7 (22.6)
Hypermetropia	15 (48.4)
Astigmatism	9 (29.0)

Table 2: Association of Refractive Amblyopia with Demographic and Clinical Variables (n=526)

Variable	Refractive Amblyopia		χ^2 Value (df)	p Value
	Present n (%)	Absent n (%)		
Age group (years)				
5-7	15 (9.8)	139 (90.2)	7.42 (2)	0.024
8-10	11 (5.2)	200 (94.8)		
>10	5 (3.1)	156 (96.9)		
Gender				
Male	17 (6.2)	256 (93.8)	0.18 (1)	0.67
Female	14 (5.6)	239 (94.4)		
Type of Refractive Amblyopia				
Isometropic	10 (3.4)	284 (96.6)	8.95 (1)	0.003
Anisometropic	21 (8.5)	211 (91.5)		
Laterality				
Unilateral	22 (7.7)	263 (92.3)	6.72 (1)	0.01
Bilateral	9 (3.9)	232 (96.1)		
Refractive Type				
Myopia	7 (4.2)	160 (95.8)	10.82 (2)	0.004
Hypermetropia	15 (8.2)	168 (91.8)		
Astigmatism	9 (6.0)	167 (94.0)		

DISCUSSION

In the present study, the prevalence of refractive amblyopia among children visiting tertiary care centre in South India was found to be 5.9%, which is comparable to reports from other Indian regions such as 4.58% (38/830) in Raipur (Saxena et al., 2023),^[9] and 6.6% (33/500) in Kolkata (Mondal et al., 2022),^[6] but lower than the 24.2% hospital-based rate reported in Shanghai, China (Wu & Wang, 2024).^[10]

The majority of cases were seen in the 5–7 year age group, consistent with previous studies highlighting early childhood years as the critical period for amblyopia detection and management.^[8,11-13] No significant gender difference was found, similar to other Indian and East Asian reports (1,3,14). Anisometropic amblyopia (67.7%) was the predominant type, as also observed by Saxena et al. (76.3%) and Mondal et al. (74.6%), Bamhane et al. (53.33%) (1,2,13), confirming anisometropia as the major amblyogenic factor. Unilateral involvement (71%) was more frequent than bilateral, comparable with prior Indian studies.^[1,2,13] Hypermetropia was the most common refractive error associated with amblyopia, aligning with the reports from both India and China where high hyperopia was a key contributor.^[2,3,16] However in a study by Sapkota K et al.^[17] astigmatism was the most common type of refractive error in amblyopic eyes (59.2%) followed by hypermetropia in 33.5%. Overall, the present findings highlights that younger age, anisometropia, unilateral amblyopia, and hypermetropic refractive error are significant risk factors. Children with amblyopia may develop monocular and binocular poor vision, which can worsen their quality of life in maturity, if treatment is not received.^[16,18,19] This emphasizes the importance of early vision screening and timely spectacle correction to prevent permanent visual deficit.

CONCLUSION

The present study demonstrates that refractive amblyopia remains an important cause of visual

impairment among children in South India, with a prevalence of 5.9%. The findings highlight that anisometropia, particularly associated with hypermetropia, is the predominant amblyogenic factor, while most cases occur in the 5–7 year age group emphasizing the need for early vision screening and timely refractive correction to prevent avoidable visual impairment in children.

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