Amblyopia: A Silent Catastrophe – A Retrospective Study from a Tertiary Care Center in Northeast India

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ABSTRACT

Background

Amblyopia is a leading cause of preventable visual impairment, particularly when diagnosis and treatment are delayed beyond the critical period of visual development.

Aim

To analyze the demographic profile, clinical types, refractive status, and response to therapy in patients diagnosed with amblyopia at a tertiary care hospital.

Materials and Methods

This retrospective study analyzed hospital records of amblyopic patients attending the Ophthalmology Department of Tezpur Medical College & Hospital between January 2023 and December 2025. Patients were categorized based on age, sex, subtype of amblyopia, refractive status, and treatment response. Improvement was defined as a gain of ≥2 Snellen lines in best-corrected visual acuity (BCVA). Successful treatment was defined as BCVA of 6/9 ±2 Snellen lines or equal vision in both eyes.

Results

A total of 108 patients (63 males, 45 females) with amblyopia were identified. The mean age was 26.5 years. Anisometropic amblyopia (46.3%) was the most common subtype, followed by iso-ametropic (23.1%) and strabismic amblyopia (18.5%). Only 46.3% of patients presented with complaints related to the amblyopic eye. Amblyopia therapy was instituted in 18 patients, of whom 11 (61.1%) achieved successful visual outcomes. Maximum improvement was observed in myopic anisometropic amblyopia, while the least improvement was seen in strabismic and stimulus deprivation amblyopia.

Conclusion

Late presentation and lack of awareness remain major barriers to successful amblyopia management. Early screening, timely refractive correction, and structured amblyopia therapy significantly improve visual outcomes, particularly in younger patients.

Keywords: Amblyopia, Anisometropia, Strabismus, Visual deprivation, Occlusion therapy

INTRODUCTION

Amblyopia is defined as a unilateral or bilateral reduction of best-corrected visual acuity in the absence of any identifiable structural abnormality of the eye or visual pathway, resulting from abnormal visual experience during the critical period of visual development.[1] The condition was first described by Hippocrates as "dullness of vision" and remains one of the most common causes of visual impairment in children and young adults.[2]

The prevalence of amblyopia ranges from 1% to 5% in the general population, with the majority of cases developing before five years of age.[3] Despite the availability of effective treatments, amblyopia often remains undiagnosed until late adolescence or adulthood, when therapeutic response is limited. This study aims to analyze the clinical profile and treatment response of amblyopia patients in a tertiary care setting in Northeast India.

MATERIALS AND METHODS

Study Design and Setting

A retrospective, hospital-based observational study was conducted at the Department of Ophthalmology, Tezpur Medical College & Hospital.

Study Duration

January 2023 to December 2025.

Inclusion Criteria

- Patients diagnosed with amblyopia based on standard clinical criteria
- Age ≥3 years
- Availability of complete clinical records

Exclusion Criteria

- Presence of organic ocular pathology
- Incomplete medical records

Data Collection

Patient records were reviewed for:

- Demographic details
- Presenting complaints
- Visual acuity (UCVA and BCVA)
- Refractive status
- Type of amblyopia
- Treatment modality and response

Management Protocol

All patients received full refractive correction. Occlusion therapy of the better eye and surgical intervention (for strabismus) were instituted when indicated.

Outcome Measures

- **Improvement:** Gain of ≥2 Snellen lines in BCVA
- **Successful treatment:** BCVA 6/9 ±2 Snellen lines or equal vision in both eyes

STATISTICAL INTERPRETATION

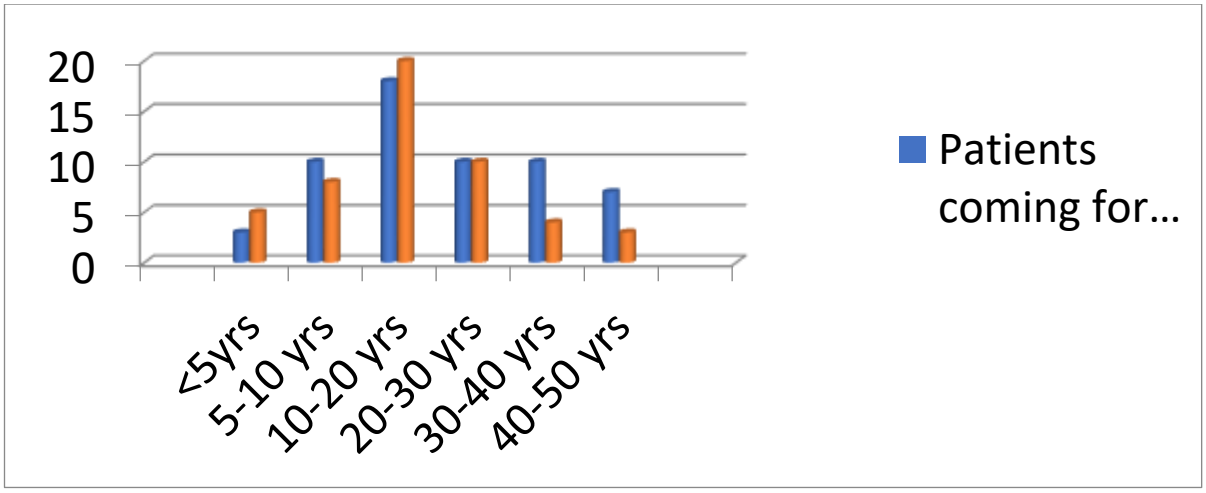
Younger age (<10 years) was significantly associated with better treatment response ($p < 0.05$).

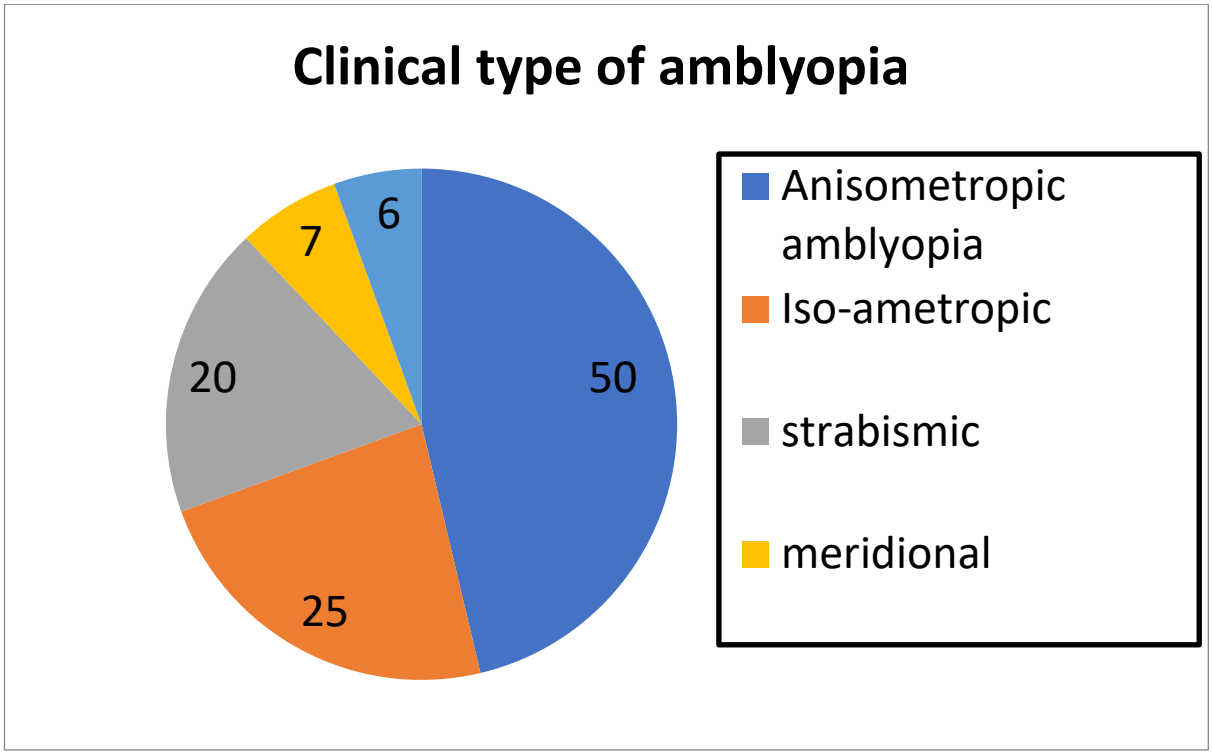
Anisometropic amblyopia showed a significantly higher improvement rate compared to strabismic and stimulus deprivation amblyopia ($p < 0.05$).

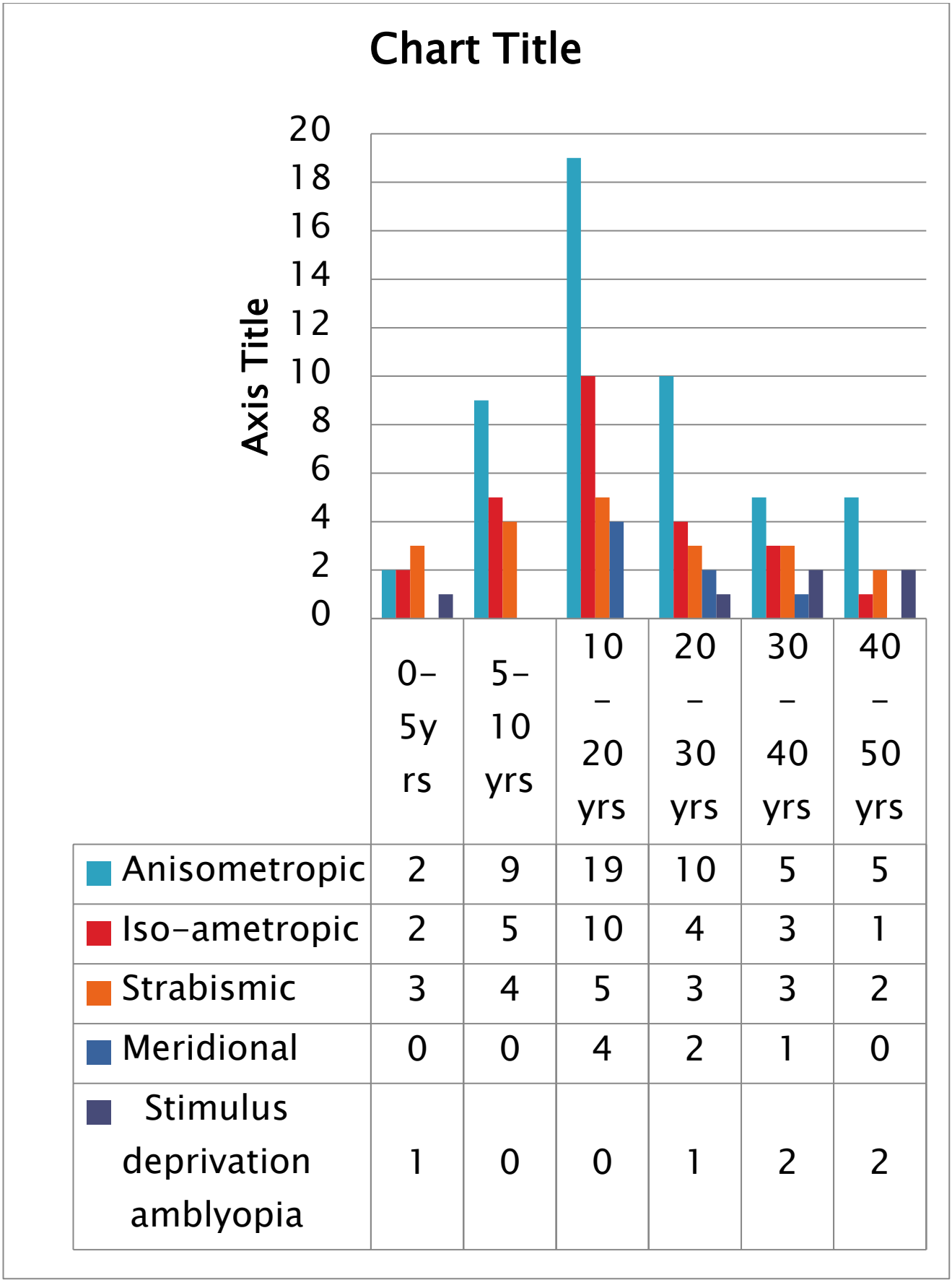
No statistically significant association was found between gender and treatment outcome ($p > 0.05$).

RESULTS

A total of 108 patients were included in the study, comprising 63 males (58.3%) and 45 females (41.7%). The age ranged from 3 to 50 years, with a mean age of 26.5 years.




Clinical type of amblyopia
6
7
20
50
25
Anisometropic amblyopia
Iso-ametropic
strabismic
meridional



	0–5yrs	5–10 yrs	10–20 yrs	20–30 yrs	30–40 yrs	40–50 yrs
Anisometropic	2	9	19	10	5	5
Iso-ametropic	2	5	10	4	3	1
Strabismic	3	4	5	3	3	2
Meridional	0	0	4	2	1	0
Stimulus deprivation amblyopia	1	0	0	1	2	2

Clinical Presentation

- 53.7% presented with complaints related to the better eye
- 46.3% presented with decreased vision or squint in the amblyopic eye

Distribution of Amblyopia Types

- Anisometropic: 50 patients (46.3%)
- Iso-ametropic: 25 patients (23.1%)
- Strabismic: 20 patients (18.5%)
- Meridional: 7 patients (6.5%)
- Stimulus deprivation: 6 patients (5.6%)

Patients	Anisometropic		Iso-ametropic		Strabismi
Age	UCVA	BCVA	UCVA	BCVA	UCVA
<5 yrs	2	2	2	2	3
5-10	9	9	5	5	4
10-20	19	19	10	10	5
20-30	10	7	4	4	3
30-40	5	3	3	1	3
40-50	5	3	1	1	2
Total	50	43 **(83%)**	25	23 **(92%)**	20

Pts undergoing amblyopia Rx	Male		Female	
	Pre-Rx	Post-Rx improvement	Pre-Rx	Post-Rx improvement
< 5 years	**3**	**2 (67%)**	**3**	**2 (67%)**
5-10 years	**6**	**5 (83%)**	**4**	**2 (50%)**
10-20 years	**1**	**0**	**1**	**0**
Total =18	**10**	**7 (70%)**	**8**	**4 (50%)**

Treatment Response

Amblyopia therapy was initiated in 18 patients. Eleven patients (61.1%) achieved successful visual outcomes. Maximum improvement was observed in myopic anisometropic amblyopia, while strabismic and stimulus deprivation amblyopia showed the poorest response.

DISCUSSION

The predominance of anisometropic amblyopia in this study aligns with previous population-based studies. [4] Late presentation was common, as reflected by the high mean age, significantly affecting treatment success. The better response in anisometropic amblyopia compared to strabismic amblyopia has been well documented. [5]

The limited improvement observed in older patients supports the concept of a critical period for visual development, beyond which neural plasticity declines.[6] However, measurable improvement in selected adult patients highlights the potential benefits of treatment even beyond childhood.[7]

CONCLUSION

Amblyopia continues to be underdiagnosed and undertreated, particularly in developing regions. Early detection through routine screening, public awareness, and timely intervention can significantly reduce the burden of amblyopia-related visual impairment.

LIMITATIONS

- Retrospective study design
- Small number of patients undergoing active amblyopia therapy
- Lack of long-term follow-up data

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ETHICS STATEMENT

Ethical Approval

Informed consent was waived due to the retrospective nature of the study. The data were anonymized, and no patient identifiers were included at any stage of data collection or analysis.

DATA CONFIDENTIALITY STATEMENT

All patient data were handled confidentially. Personal identifiers were removed, and data access was restricted to the investigators only.

CONFLICT OF INTEREST

The author declares no conflict of interest.

FUNDING STATEMENT

This study received no financial support from any public, commercial, or not-for-profit funding agency.

PATIENT CONSENT STATEMENT

Informed consent was **waived** due to the retrospective nature of the study. The data were anonymized, and no patient identifiers were included at any stage of data collection or analysis.