International Journal of Research in Medical Sciences
Raina A et al. Int J Res Med Sci. 2025 Apr;13(4):1582-1586
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20250985

Original Research Article

Demographic and clinical profile of amblyopia in paediatric age group at a tertiary care centre in northern India

Ananta Raina[1], Neharika Verma[2]*, Ashok K. Sharma[2]

[1]Department of Ophthalmology, Government Doon Medical College, Dehradun, Uttarakhand, India
[2]Department of Ophthalmology, Government Medical College, Jammu, Jammu and Kashmir, India

Received: 21 February 2025
Revised: 17 March 2025
Accepted: 20 March 2025

***Correspondence:**
Dr. Neharika Verma,
E-mail: neharika2112@gmail.com

ABSTRACT

Background: Amblyopia, also referred to as "lazy eye," is one of the most common leading causes of monocular visual impairments among children around the world. This study was aimed to study the demographic profile, type and treatment outcome of amblyopia in children visiting a tertiary care centre in Northern India.
Methods: A retrospective observational study was conducted on 250 children between the ages of 3-18 years, diagnosed with amblyopia between 2020-2024 in GMC, Jammu. A patient register was developed, comprising patient's name, age, gender, type of amblyopia and treatment outcome. The data were analysed using descriptive statistics and chi-square tests.
Results: Most cases (76%) were diagnosed in children aged 3-10 years, with a male predominance (64.8%). The most common type was refractive amblyopia (48%) followed by strabismic (32%) and deprivation amblyopia (20%). Astigmatism was the most common refractive error (58.3%). Outcomes of treatment were reported, improved in 72% of cases, non-improved in 20%, and non-applicable in 8% of patients.
Conclusions: Amblyopia is best addressed when detected early enough. Amblyopia burden can be significantly reduced by integrating school-based vision screening programs and addressing socio-cultural barriers. More population-based studies are needed to explore its prevalence and accompanying determinants in different contexts.

Keywords: Amblyopia, Occlusion therapy, Refractive error

INTRODUCTION

Amblyopia also referred to as "lazy eye" occurs in childhood when the brain and eyes are developing, causing reduced vision in one eye due to abnormal visual development.[1] In the words of von Noorden, amblyopia is the "unilateral or bilateral decrease of best-corrected visual acuity (BCVA) caused by form deprivation, abnormal binocular interaction, or both, for which no organic cause can be detected by physical examination of the eye and which in appropriate cases is reversible by therapeutic means at the appropriate time."[2] A discrepancy of two or more Snellen's lines or the logarithm of the minimum angle of resolution (log MAR) lines in BCVA between the normal and amblyopic eyes (in the event of unilateral amblyopia) is a commonly used statistical definition of amblyopia based on visual acuity (VA). A BCVA of less than 6/12 is recommended for bilateral amblyopia.[3] Amblyopia patients have impaired stereo acuity, aberrant fine motor skills, and decreased reading speed.[4] It is an important public health issue, being the main cause of monocular visual disability in children globally. Early detection and intervention are critical to prevent long-term visual deficits.

Around the world, amblyopia affects about 1.36% of children.[5] Boys show a higher rate at 1.40%, while girls have a rate of 1.24%. In one study, the prevalence of amblyopia is reported to be 1–6% in children and 1.43–5.64% in adults.[6] In India different areas show different

rates of amblyopia. A study in South India found that 1.1% of children had this condition.[7] The main causes were ametropia (50%) and anisometropia (40.9%). Another cross- sectional study conducted among children aged 5 to 15, was carried out at the Regional Institute of Ophthalmology, Medical College, Kolkata.[8] Out of the 500 children included in the study, 264 (52.8%) were male. 479 (95.8%) of the participants were between the ages of 5 and 10 years, with the age range being 5 to 15 years. In 57 cases, amblyopia was found (11.4%).

Amblyopia is mostly caused by problems with refraction, crossed eyes, and obscured vision. Untreated near-sightedness, farsightedness, or astigmatism can result in aniosmetropic amblyopia.[9] When the eyes are out of alignment, the brain ignores the image of one eye in order to prevent perceiving double vision, a condition known as strabismic amblyopia.[10] Things that prevent light from entering the eye, such birth-related cataracts, cause visual deprivation amblyopia.[11]

A study in RIO, Kolkata, it was concluded that Anisometropic amblyopia topped the list as the most frequent subtype. The most prevalent form of amblyopia was refractive amblyopia (58.4%), with anisometropic amblyopia accounting for 74.6% of cases. In 80.5% of cases, unilateral amblyopia was noted.[8]

Amblyopia can change a child's life. It can affect the growth, personality and development of child. So, in order to prevent from such effects on personality, its crucial to detect and treat amblyopia early in life.[12] Treatments like special glasses covering one eye, and sometimes surgery can help manage amblyopia.[13] So, the study was designed to study the clinical profile of children with amblyopia, their age, gender, type of amblyopia and response to treatment.

METHODS

The retrospective, observational and descriptive study was conducted at Government Medical College, Jammu. Data was gathered from medical records of 250 children who came to the hospital from September 2020 to December 2024 and were diagnosed with amblyopia. The key information such as personal details (age, gender), diagnosis, and treatment was collected and this data was entered in a structured format to analyse. This study was performed following the tenets of the Declaration of Helsinki.

Inclusion criteria

A data fulfilling following characteristics were included in the study: children between 3 and 18 years, diagnosed with amblyopia and full medical records available.

Exclusion criteria

The records with following characteristics were excluded from the study: children with systemic illness, other ophthalmic diseases (unrelated to amblyopia), and incomplete medical records.

The patient's records satisfying inclusion criteria were included in the study. The tools used for diagnosing amblyopia included standard ophthalmic equipment and tests. Visual acuity was measured using Snellen's chart chart/ subjective refraction. Retinoscope was used to check for refractive errors like myopia, hyperopia, or astigmatism. Hirschberg's test, cover test and cover-uncover test was done to detect strabismus (eye misalignment). Anterior segment examination was done on slit lamp examination. Direct and indirect Ophthalmoscopy was done for examining posterior segment. Upon diagnosis of amblyopia, all patients were explained about the occlusion therapy and refractive correction as a treatment and regular follow up.

The study was carried out using the following methods:

Information gathering

OPD records of 2020 to 2024 were examined and children diagnosed with amblyopia were selected. The patient's age, gender, type of amblyopia like strabismus or refractive problems were among the data gathered.

Prevalence calculation

The number of children with amblyopia diagnoses divided by the total number of patients aged 3 to 18 who visited the hospital during the study period was the prevalence of amblyopia. This made it easier to comprehend how widespread amblyopia was in the area.

Etiological classification

Three primary categories of amblyopia were identified by the study: deprivation, strabismic, and refractive amblyopia. The kind of refractive error (such as myopia or hyperopia) was used to further characterize refractive amblyopia. According to the presence of misaligned eyes, strabismic amblyopia was noted.

Analysis of data

The data was analysed using descriptive statistics. We looked for any trends or noteworthy variations by analysing age, gender, and the various forms of amblyopia. The chi-square test was applied to determine whether the observed differences between groups (e.g., gender or age) were statistically significant.

The study adhered with ethical standards to protect patient privacy. Only the relevant data was used for the study.

Figure 1: Strabismic Amblyopia.

Figure 2: Anisometropic Amblyopia.

Statistical analysis

Statistical analysis will be done by using SPSS software for windows version 25. Qualitative data will be depicted as numbers and percentages whereas quantitative as mean ± standard deviation.

RESULTS

Out of the data collected, it was found that a total of 250 patients were diagnosed with amblyopia in four-year duration, out of which 162 were males and 88 were females with a male: female ratio of 1.84. The mean age of presentation was 8±3.88 years (Table 1).

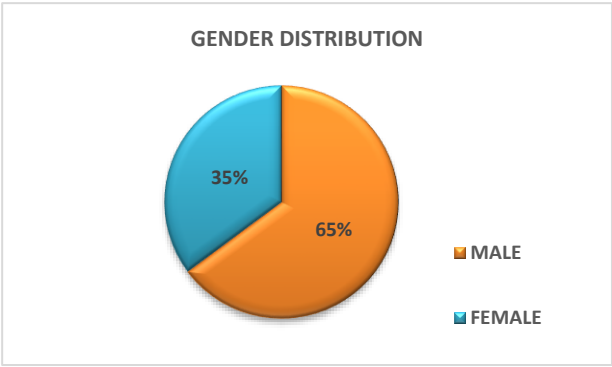

Figure 3: Gender distribution of amblyopia cases.

The Figure 3 represents the gender distribution of children with amblyopia.

Following are the tables depicting study outcomes, Table 1 showing demographic characteristics of patients diagnosed with amblyopia, Table 2 classifies amblyopia, Table 3 depicts distribution of refractive errors among the cases of anisometropic amblyopia and Table 4 shows treatment outcomes.

Table 1: Demographic characteristics of amblyopia patients.

Demographic parameter	Frequency (N)	Percentage (%)
Total sample size	250	100
Age group in years		
3-5	100	40
6-10	90	36
11-15	45	18
16-18	15	6
Gender		
Male	162	64.8
Female	88	35.2

Table 2: Types of amblyopia in the study.

Type of amblyopia	Frequency (N)	Percentage (%)
Anisometropic amblyopia	120	48
Strabismic amblyopia	80	32
Deprivation amblyopia	50	20

Table 3: Distribution of refractive errors in amblyopia cases.

Refractive error	Frequency (N)	Percentage (%)
Myopia	15	12.5
Hyperopia	35	29.2
Astigmatism	70	58.3

Table 4: Outcome of treatment in amblyopia cases.

Treatment outcome	Frequency (N)	Percentage (%)
Improved	180	72
No improvement	50	20
Not applicable (deprivation)	20	8

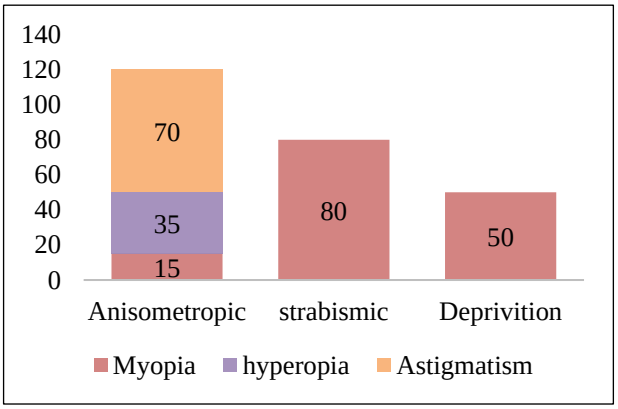

Figure 4: Types of amblyopia along with distribution of refractive errors.

Figure 4 depicts the distribution of different types of amblyopia with subtypes of anisometropic amblyopia as myopia, hyperopia and astigmatism.

DISCUSSION

The research examined 250 amblyopia cases at a tertiary center in Northern India of Jammu region. The results showed that most often 3- and 10-years old children are diagnosed amblyopia, with the 3-5 year age range making up 40% of cases. This spread matches the key stage of visual growth when the brain's vision pathways are most flexible. To spot this issue in this time frame is key, as it gives clinician a chance to step in to stop long-lasting sight problems.

When it comes to gender, the study showed that amblyopia was more common in males (64.8%) than in females (35.2%). This higher rate in males matches up with studies done in specific areas, like one in Etawah, Uttar Pradesh. That study found that 1.47% of males and 1.11% of females had amblyopia.[14] Looking at the bigger picture similar patterns show up worldwide, with overall rates of 1.4% in males and 1.24% in females.[6] The gender gap we see might have an influence on socio-cultural elements, like health practices that lean towards boys as well as biological distinctions that could make males more likely to have eye problems.[16,17] What we've found highlights how crucial it is to make sure everyone can get healthcare so girls can be checked and treated when they need to be.

The breakdown of amblyopia types showed that anisometropic amblyopia topped the list making up 48% of cases. Strabismic amblyopia came in second at 32%, while deprivation amblyopia accounted for 20%. This trend matches what other studies have found. Research in Southern India pinpointed refractive amblyopia as the main type covering 50% of cases.[7] Another study in Etawah reported it at 58.4%.[14] When we look closer at refractive amblyopia, Astigmatism was the most common refractive error seen in 58.3% of cases, hyperopia followed at 29.2%, and myopia at 12.5%. As evident from a study, that during the early phases of development, the uncorrected astigmatism can cause blurring of vision and subsequently to the development of amblyopia, which can be successfully reduced with best correction at early age of development.[5]

The study's treatment results showed that 72% of patients got a lot better proving that refractive correction, special glasses covering one eye, and occlusion therapy works well. But 20% of cases didn't get better, and 8% couldn't be judged because of how their lazy eye developed. These findings show why it's so important to catch and treat ophthalmic problems for babies born with issues like cataracts, to stop them from losing their sight forever. The fact that so many patients improved means we need more programs to teach people about eye health and check eyes as routinely in their communities. This way, we can catch and treat problems while children's eyes are still developing.

This study's findings match up with worldwide and local patterns when we look at similar research, but it also gives us new information about people in Northern India. The number of cases we found is approximately in line with what the Etawah study showed (1.4%), but it's higher than what they saw in Southern India (1.1%).[14,7] This difference between regions might be because of healthcare facilities, knowledge about the condition, and environmental factors. We found that anisometropic amblyopia is the most common type, which is the same as what other studies in India and around the world have found. This highlights the importance of refractive errors and its correction.

This study highlights the critical need to incorporate amblyopia screening into school health programs for early detection and intervention of vision problems. Public health efforts should aim to eliminate socio-cultural barriers that hinder access for girls and guarantee that all children have access to comprehensive eye care services. Customized awareness campaigns, especially in rural and underserved communities, can play a vital role in improving detection and treatment rates, ultimately lessening the overall impact of amblyopia in the population.

This study has few limitations. It is a single-center study so the findings may not be generalizable to other regions. Also being a retrospective study, the medical records and data maybe incomplete. The lack of long-term follow-up data limits knowledge about sustained treatment outcomes. Socioeconomic and environmental factors, which influence amblyopia prevalence and management, were not considered.

CONCLUSION

This study provides significant insights into the prevalence and contributing factors of amblyopia by examining the clinical and demographic characteristics of the condition in children at a tertiary care facility in Northern India. According to the results, amblyopia is most prevalent in youngsters between the ages of three and ten, and it is more common in males than in girls. With astigmatism being the most common refractive error, anisometropic amblyopia has been identified to be the most prevalent form. According to both global and regional data, these patterns show how important early detection and timely management are in preventing long-term visual impairments.

The study highlights the importance of routine vision screening programs as part of school health initiatives, especially in the early years when visual development is most critical. In order to address disparities between genders, it is essential to guarantee fair access to eye care services, particularly for girls. Early identification and treatment can be significantly enhanced by public health

initiatives that increase knowledge of refractive errors and other variables that contribute to amblyopia. The study's high treatment success rate highlights the value of early-initiation procedures such as occlusion therapy and corrective lenses. Nonetheless, the persistent proportion of cases that show no improvement emphasizes the need for early identification of congenital and deprivation-related problems.

Recommendations

To better understand the incidence of amblyopia and its determinants in many circumstances, future research should adopt a population-based approach. By combining targeted interventions, policy support, and community involvement, we can significantly lessen the impact of amblyopia, enhancing the quality of life for affected children and their families.

ACKNOWLEDGEMENTS

Authors would like to thank Department of Ophthalmology, GMC Jammu for their support during study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Ro Kates MM, Beal CJ. Amblyopia. JAMA 2021;325(4):408.
2. Von Noorden GK, Campos E. Binocular vision and ocular motility. 6th ed. St. Louis, MO: Mosby; 2002.
3. Kaur S, Sharda S, Aggarwal H, Dadeya S. Comprehensive review of amblyopia: types and management. Ind J Ophthalmol 2023;71(7):2677-86.
4. O'Connor AR, Birch EE, Anderson S, Draper H. Relationship between binocular vision, visual acuity, and fine motor skills. Optom Vis Sci. 2010;87(12):942-47.
5. Hu B, Liu Z, Zhao J, Zeng L, Hao G, Shui D, Mao K. The global prevalence of amblyopia in children: A systematic review and meta-analysis. Front Pediatr. 2022;10:819998.
6. Meng Z, Fu J, Chen W, Li L, Su H, Dai W, et al. Prevalence of amblyopia and associated risk factors in Tibetan grade one children. Ophthalmic Res. 2021;64:280-89.
7. Ganekal S, Jhanji V, Liang Y, Dorairaj S. Prevalence and etiology of amblyopia in southern India: results from screening of school children aged 5-15 years. Ophthalmic Epidemiol. 2013;20(4):228-31.
8. Mondal M, Ghosh AK, Dutta S. Prevalence and pattern of amblyopia among children attending a tertiary eye care centre in Eastern India. Int J Res Med Sci. 2022;10(2):435-38.
9. DK P. Anisometropia. In: Brookman KE, editor. Boston: Butterman-Heinemann; 1996:99-121.
10. Tuchsen L. Causing and curing infantile esotropia in primates: The role of decorrelated binocular input. Trans Am Ophthalmol Soc. 2007;105:564-93.
11. Blair K, Cibis G, Zeppieri M, Gulani AC. Amblyopia. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.
12. Fayi KA, Alahmari DS, Alamri DS, Al-Falki YH. Prevalence of amblyopia and its impact on academic performance of male medical students in southern Saudi Arabia. Saudi J Ophthalmol. 2018;32(4):290-94.
13. Chen AM, Cotter SA. The amblyopia treatment studies: Implications for clinical practice. Adv Ophthalmol Optom. 2016;1(1):287-305.
14. Pant K, Khan S, Bansal R. Prevalence of persistent refractive amblyopia amongst schoolchildren in North India: A population-based observational study of childhood visual deficit and its correlation with heterophoria and NPC. Int J Res Rev. 2020;7(9):11-16.
15. Harvey EM. Development and treatment of astigmatism-related amblyopia. Optom Vis Sci. 2009;86(6):634-39.
16. Azad AD, Charles AG, Ding Q, Trickey AW, Wren SM. The gender gap and healthcare: Associations between gender roles and factors affecting healthcare access in Central Malawi, June-August 2017. Arch Public Health. 2020;78(1):119.
17. Courtright P, Lewallen S. Improving gender equity in eye care: Advocating for the needs of women. Commu Eye Heal. 2007;20(64):68-9.

Cite this article as: Raina A, Verma N, Sharma AK. Demographic and clinical profile of amblyopia in paediatric age group at a tertiary care centre in northern India. Int J Res Med Sci 2025;13:1582-6.