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ORIGINAL ARTICLE

Clinical Characteristics and Distribution of Amblyopia Among Children — A Hospital-Based Study in Sylhet

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ABSTRACT

Background: *Amblyopia is a leading cause of childhood visual impairment worldwide. Early diagnosis and management are critical to prevent permanent vision loss. However, data on the clinical characteristics and distribution of amblyopia in children from northeastern Bangladesh are scarce.* ***Objective:*** *To describe the clinical characteristics, types, severity, and distribution of amblyopia among children aged 5–15 years attending Sylhet MAG Osmani Medical College Hospital.* ***Methods & Materials:*** *This descriptive cross-sectional study included 120 children with best corrected visual acuity ≤20/40 in one or both eyes. Data were collected through comprehensive ophthalmic examinations. Amblyopia was classified per the American Academy of Ophthalmology guidelines. Data analysis was performed using SPSS 26.0.* ***Results:*** *Most participants (79.2%) were older than 10 years, with a male predominance (56.7%). Refractive amblyopia was the most common type (56.7%), followed by strabismic (24.2%), combined mechanism (12.5%), and deprivation amblyopia (6.6%). Moderate amblyopia was most prevalent (48.3%), and unilateral amblyopia accounted for 68.3% of cases. Hypermetropia (36.7%) was the leading refractive error, followed by myopia (31.7%) and astigmatism (20.8%). Only 15.8% had a positive family history, and 17.5% had prior vision screening.* ***Conclusion:*** *Refractive amblyopia predominates among children in this region, with late diagnosis and low screening rates highlighting the urgent need for early vision screening programs and increased community awareness to prevent long-term visual impairment.*

Keywords: *Amblyopia, Refractive errors, Childhood visual impairment, Sylhet, Vision screening, Pediatric ophthalmology*

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INTRODUCTION

Amblyopia, commonly known as "lazy eye," is a neurodevelopmental visual disorder characterized by reduced visual acuity in one or both eyes that cannot be corrected solely by refractive means and is not attributable to any structural abnormality of the eye or visual pathways[1]. It typically arises during early childhood when abnormal visual experience disrupts the development of the visual cortex, leading to impaired vision[2]. Amblyopia remains one of the leading causes of visual impairment in children worldwide, with a global prevalence estimated between 1% and 5%[3]. The major causes of amblyopia include refractive errors (anisometropia, isometropia), strabismus, deprivation (due to cataract, ptosis, or other media opacities), or a combination of these factors[4]. Among these, refractive and strabismic amblyopia are the most common subtypes encountered in clinical practice[5]. Early detection and timely treatment during the critical period of visual development, typically before 7–8 years of age, can substantially improve visual outcomes and prevent permanent visual disability[6]. Despite the availability of effective treatment options such as refractive correction, occlusion therapy, and penalization, many children remain undiagnosed or present late, particularly in low-resource settings[7]. Late presentation often results from lack of awareness, inadequate vision screening programs, and limited access to pediatric

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ophthalmic services[8]. Understanding the demographic and clinical characteristics of amblyopic children within specific populations is vital for designing targeted screening and intervention strategies. Although several studies have addressed childhood visual impairment and refractive errors in Bangladesh, there is a lack of comprehensive, region-specific data on the prevalence and clinical characteristics of amblyopia. This hospital-based study aims to describe the clinical characteristics, types, severity, and distribution of amblyopia among children presenting at Sylhet MAG Osmani Medical College Hospital, thereby contributing to the evidence base necessary for improving pediatric eye care services in the region.

METHODS & MATERIALS

This descriptive cross-sectional study was conducted in the Department of Ophthalmology at Sylhet MAG Osmani Medical College Hospital over a one-year period from January 2024 to December 2024. The study population included children aged 5–15 years presenting with best corrected visual acuity of ≤20/40 in one or both eyes, in the absence of any organic ocular lesions. A total of 120 children were selected using purposive convenient sampling. Children with a history of ocular surgery, trauma, mental retardation, congenital ocular anomalies, ptosis, strabismus, media opacity, or other fixation impairments were excluded. Informed written consent was obtained from parents or guardians before participation. Data were collected through interviews to obtain socio-demographic details, family history, and previous vision screening information. This was followed by comprehensive ophthalmic examinations, including Snellen visual acuity testing, cycloplegic refraction, slit-lamp biomicroscopy, ophthalmoscopy, and ocular alignment assessments. Amblyopia was diagnosed and classified according to the American Academy of Ophthalmology Preferred Practice Pattern (2017), including criteria for unilateral and bilateral amblyopia, severity levels, and subtypes such as ametropic, anisometric, and meridional amblyopia. All diagnoses were confirmed by the resident ophthalmologist. Data were analyzed using SPSS version 26.0. Ethical approval was obtained from the Institutional Review Board of Sylhet MAG Osmani Medical College, and confidentiality was strictly maintained throughout the study.

RESULTS

The study was done in the Department of Ophthalmology, Sylhet MAG Osmani Medical College Hospital, Sylhet on 120 children who had refractive errors.

Table – I: Demographic Characteristics of Amblyopic Children (*n*=120)

Variable	Frequency (n)	Percentage (%)
Age Group (Years)		
5–10	25	20.8
>10	95	79.2
Gender	**Frequency (n)**	**Percentage (%)**
Male	68	56.7
Female	52	43.3
Residence		
Urban	48	40.0
Rural	72	60.0

The majority of the study participants (79.2%) were aged above 10 years, while only 20.8% were in the 5–10-year age group. This indicates that older children were more frequently diagnosed or brought in for evaluation of amblyopia. In terms of gender distribution, males constituted a higher proportion of the study population (56.7%) compared to females (43.3%), resulting in a male-to-female ratio of approximately 1.3:1. A higher percentage of children with amblyopia (60.0%) came from rural areas, while 40.0% were from urban settings.

Table – II: Distribution of Types of Amblyopia (*n*=120)

Type of Amblyopia	Frequency (n)	Percentage (%)
Refractive	68	56.7
Strabismic	29	24.2
Combined mechanism	15	12.5
Deprivation	8	6.6
Total	120	100

The most prevalent type of amblyopia among the children was refractive amblyopia, observed in 56.7% of the participants. This was followed by strabismic amblyopia in 24.2%, and combined mechanism amblyopia (a mix of refractive and strabismic causes) in 12.5% of cases. The least common was deprivation amblyopia, found in 6.6% of children.

Table – III: Severity of Amblyopia (*n*=120)

Severity Level	Frequency (n)	Percentage (%)
Mild (20/40–20/60)	49	40.8
Moderate (20/70–20/100)	58	48.3
Severe (<20/100)	13	10.9
Total	120	100

Based on visual acuity classification, most children had moderate amblyopia. The majority of the children in the study had moderate amblyopia (20/70–20/100), accounting for 48.3% of the cases. This was followed by mild amblyopia (20/40–20/60) in 40.8% and severe amblyopia (<20/100) in only 10.9% of participants.

Laterality of Amblyopia

The majority of children with amblyopia had unilateral involvement, accounting for 82(68.3%) of cases, whereas 38(31.7%) had bilateral amblyopia.

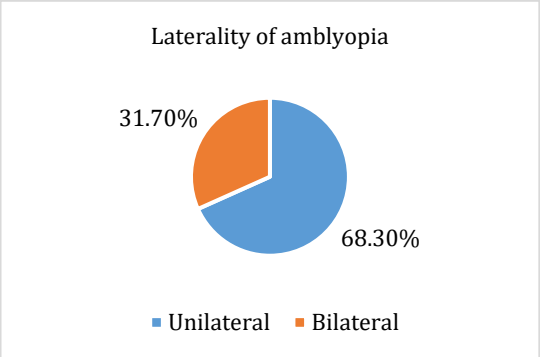

Figure – 1: Laterality of Amblyopia (*n*=120)

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Table – IV: Refractive Error Types Among Amblyopic Children (*n*=120)

Refractive Error Type	Frequency (n)	Percentage (%)
Hypermetropia	44	36.7
Myopia	38	31.7
Astigmatism	25	20.8
Mixed	13	10.8
Total	120	100

Among the amblyopic children, hypermetropia was the most common refractive error, present in 36.7% of cases, followed closely by myopia in 31.7%. Astigmatism accounted for 20.8%, and mixed refractive errors were observed in 10.8% of participants.

Table – V: Family History and Screening Status (*n*=120)

Variable	Frequency (n)	Percentage (%)
Family history present	19	15.8
Family history absent	101	84.2
Prior screening done	21	17.5
No prior screening	99	82.5

Only 15.8% of children had a positive family history of amblyopia or strabismus, while a large majority (84.2%) had no such family history. Additionally, only 17.5% had undergone prior vision screening, whereas 82.5% had never been screened before.

DISCUSSION

This hospital-based cross-sectional study aimed to explore the clinical characteristics and distribution of amblyopia among children aged 5–15 years attending the Department of Ophthalmology at Sylhet MAG Osmani Medical College Hospital. The findings provide valuable insights into the types, severity, and associated risk factors of amblyopia in this population. In this study, the majority (79.2%) of amblyopic children were older than 10 years, indicating late presentation or diagnosis. This finding suggests late presentation, which is a concerning trend, as amblyopia is most responsive to treatment during the early critical period of visual development, typically before 7 to 8 years of age[9]. A similar age trend was observed that most amblyopic cases were identified in the older age groups among school-going children, reflecting a consistent pattern of late detection in South Asian settings[10]. Regarding gender distribution, our study found a male predominance (56.7% male vs. 43.3% female), with a male-to-female ratio of approximately 1.3:1. This finding aligns with the results of Faraz et al., who also reported a higher frequency of amblyopia in male children[10]. This male predominance is consistent with findings from a study by Awan et al., conducted among middle school children in Lahore, Pakistan, where amblyopia was also more frequently observed in boys than in girls[11]. However, there is no biological evidence suggesting that amblyopia is more common in males than females. A majority of the children with amblyopia (60.0%) resided in rural areas, this rural predominance may indicate delayed detection or limited access to early eye screening services in rural communities, emphasizing the need for awareness and outreach programs in those areas. In our study, refractive amblyopia was the most common type, observed in 56.7% of children, followed by strabismic amblyopia (24.2%), combined mechanism (12.5%), and deprivation amblyopia (6.6%). This finding is in line with the results of Alkahiry and Siddiqui, who also reported refractive amblyopia as the most prevalent type in their hospital-based study in Karachi[12]. Their study highlights those uncorrected refractive errors remain a leading cause of amblyopia in children, particularly in settings where routine vision screening is lacking. Moreover, the high prevalence of refractive amblyopia corresponds with the findings of Iqbal et al., who reported a significant burden of uncorrected refractive errors among school-going children in Faisalabad, with hypermetropia and astigmatism being dominant types[13]. In our study, mild amblyopia was the most frequently observed severity (45.8%), followed by moderate (34.2%) and severe (20%) cases. This distribution suggests that a substantial proportion of amblyopic children may not experience noticeable visual disability, which can delay diagnosis and treatment. Our findings align with those of Rajavi et al., who reported that most amblyopia cases detected among primary school children were of mild to moderate severity[14]. Their study emphasized that early identification through school screening programs enables detection before the condition progresses to severe stages. In our study, unilateral amblyopia was significantly more common (68.3%) than bilateral amblyopia (31.7%), which aligns with patterns reported in both clinical and population-based settings. The comprehensive population-based study conducted by Faghihi et al. in Mashhad, Iran, similarly noted that unilateral amblyopia accounted for approximately 54% of amblyopic cases in the general population, while bilateral involvement was less frequently observed[15]. This predominance of unilateral amblyopia is clinically important, as unilateral cases often go unnoticed without screening due to the presence of normal vision in the fellow eye, making early detection through systematic screening essential for effective treatment and prevention of long-term visual impairment[16]. Hypermetropia (36.7%) was the most frequent refractive error among amblyopic children in our study, followed by myopia (31.7%) and astigmatism (20.8%). This distribution aligns with findings from Fotouhi et al., who reported hypermetropia as the predominant refractive error among schoolchildren in Dezful, Iran[17]. Similarly, a hospital-based study by Opubiri et al. in South-South Nigeria found a comparable pattern of refractive errors, with hypermetropia being the most common cause of amblyopia in children[18]. Mixed refractive errors were also present (10.8%), suggesting a complex visual burden in a subset of patients. Only 15.8% of children in our study had a positive family history of amblyopia or strabismus, and merely 17.5% had undergone prior vision screening. These findings indicate a considerable gap in community awareness and the implementation of early detection programs. Studies have demonstrated that early screening, especially during preschool years, significantly

improves timely diagnosis and treatment outcomes, thereby reducing the risk of permanent visual impairment[19,20].

Limitations of the Study

This study was conducted in a single tertiary hospital and may not be generalizable to the broader pediatric population in Bangladesh. The use of purposive convenient sampling might have introduced selection bias. Additionally, the cross-sectional design limits the ability to infer causality or assess treatment outcomes.

Conclusion

The study reveals that refractive amblyopia is the most prevalent type among children aged 5–15 years, with moderate severity and unilateral presentation being the most common. A substantial proportion of children were diagnosed late, and prior vision screening was infrequent. These findings underscore the need for early school-based vision screening programs and greater public awareness about amblyopia to reduce preventable visual impairment.

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