

ANISOMETROPIA AND ITS ASSOCIATION WITH AMBLYOPIA IN SCHOOL GOING CHILDREN

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ABSTRACT

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Received: 07.12.2025

Accepted: 09.06.2026

Published: July 2026

Cite this article:

Bari KN, Islam S, Ali S, Haq RU. Anisometropia and its association with amblyopia in school going children. J Med Coll Women Hosp. 2026;22(2): 59-64.

Background: The frequent co-existence of amblyopia and anisometropia at a child's first clinical examination promotes the belief that the anisometropia has caused the amblyopia. Although anisometropia and amblyopia are often revealed at the same time during school vision screening, It is widely thought that anisometropia is a pioneer of amblyopia. **Objective:** To assess the degree of anisometropia and its association with amblyopia in school going children. **Materials and Method:** This prospective observational study was conducted in the Department of Paediatric Ophthalmology in National Institute of Ophthalmology & Hospital from January 2017 to December 2018 over 50 diagnosed patients of anisometropic amblyopia age between 5-11 years. Selected patients underwent detail ophthalmic and systemic evaluation as well as relevant investigation. Visual acuity was assessed with special emphasis which includes unaided, with pinhole and after refraction. Visual acuity was recorded in Snellen's chart. All the relevant data were recorded in pre-designed data collection sheet. Data were expressed as frequency, percentage, mean $\pm$ SD and Chi Square test and Logistic regression analysis was performed to observe Odds Ratio (OR). 95% confident interval (CI) was calculated and p value <0.05 was accepted as level of significance. Statistical analyses were performed by using IBM SPSS (statistical package for social sciences) Statistics for Windows version 26.0. **Results:** In this study, 21 (42%) patients were myopic, 10 (20%) were hyperopic and 19 (38%) were astigmatic. About 44% patients had mild anisometropia, 28% had moderate anisometropia and 28% patients had severe anisometropia. Forty-eight (48%) percent patients had mild amblyopia, 34% had moderate amblyopia and 18% patients had severe amblyopia. Our study revealed that Anisometropia was significantly ($p<0.001$) associated with amblyopia. Logistic Regression Analysis showed anisometropia was 2 times more risk for development of severe amblyopia. **Conclusion:** It can be concluded that anisometropia was an independent predictor for development of amblyopia in children.

Keywords: Anisometropia, Children, Eye health, Predictor, Amblyopia, Early diagnosis.

INTRODUCTION

Amblyopia has traditionally defined as a decrease of visual acuity caused by pattern vision deprivation or abnormal binocular interaction for which no causes can be detected by the physical examination of the eye and which in appropriate cases may be reversible by therapeutic measures¹. Amblyopia is estimated to afflict 1%-4% of children with recent large population studies falling in the range of 1.6%-3.6% and with evidence that the rate is even higher in medically underserved populations².

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Amblyopia has been traditionally divided into three classes- anisometropic, derivational and strabismic. Anisometropic amblyopia involves both deprivation and abnormal binocular interaction³. The disorder is caused by any condition abnormal or inadequate visual input during infancy or childhood. These conditions can an imbalance in the positioning of the eyes such as strabismus, in which the eyes are crossed inward or outward. Amblyopia also can result from a major difference in refractive error between the two eyes, such as myopia, hypermetropia or astigmatism³⁻⁵.

The frequent co-existence of amblyopia and anisometropia at a child's first clinical examination promotes the belief that the anisometropia has caused the amblyopia⁶. Although anisometropia and amblyopia are often revealed at the same time during school vision screening, it is widely thought that anisometropia is a pioneer of amblyopia. Conclusive evidence that anisometropia precedes development of amblyopia is deficient and simplicity of this cause-and-effect relationship remains to be challenged^{6,7}.

Amblyopia is a treatable and preventable cause of low vision in pediatric group. Early diagnosis and treatment of amblyopia is very significant. The risk of amblyopic patient becoming blind is significantly higher than in the general population. Screening agendas in school children would identify not only amblyopia, but also ametropias, strabismus and visual deprivation^{8,9}. Therefore, early diagnosis and treatment in time will prevent amblyopia and subsequent vision impairment. Contemporary study is conducted to assess the degree of anisometropia and its association with amblyopia in school going children.

MATERIALS AND METHOD

This prospective observational study was conducted in the Department of Paediatric Ophthalmology in National Institute of Ophthalmology & Hospital from January 2017 to December 2018 over 50 diagnosed patients of anisometropic amblyopia age between 5 years-11 years. Patients suffering systemic diseases, corneal opacity, cataract, pathological myopia, amblyopia associated with strabismus, taking treatment in past 6 months, current vision therapy or orthoptics, prior intraocular or refractive surgery were excluded. Ethical approval was obtained from the ethical review board of the institution prior to the beginning of the study. The purpose, along with its procedure risks and benefits of the study were explained to the patients and their parents in easily understandable local language and then informed consent were taken from each participant's parents. Selected patients underwent detail ophthalmic and systemic evaluation as well as relevant investigation. Visual acuity was assessed with special emphasis which includes unaided, with pinhole and after refraction. Visual acuity was recorded in Snellen's chart. All the relevant data were recorded in pre-designed data collection sheet. Data were expressed as frequency, percentage, mean $\pm$ SD and Chi Square test and Logistic regression analysis was performed to observe OR. 95% confident interval (CI) was calculated and p value <0.05 was accepted as level of significance. Statistical analyses were performed by using IBM SPSS (statistical package for social sciences) Statistics for Windows version 26.0.

RESULTS

In this study, mean age of the patients were 8 ± 1.72 years and majority (54%) were female (Table 1). About 21 (42%) patients were myopic, 10 (20%) were hyperopic and 19 (38%) were astigmatic (Table 2). Figure 1 showed 44% patients had mild anisometropia, 28% had moderate anisometropia and 28% patients had severe anisometropia. Table 3 showed 48% patients had mild amblyopia, 34% had moderate amblyopia and 18% patients had severe

amblyopia. Our study revealed that anisometropia was significantly ($p < 0.001$) associated with amblyopia (Table 4). Logistic Regression Analysis showed anisometropia was 2 times more risk for development of severe amblyopia (Table 5).

Table 1: General characteristics of the subjects (n=50)

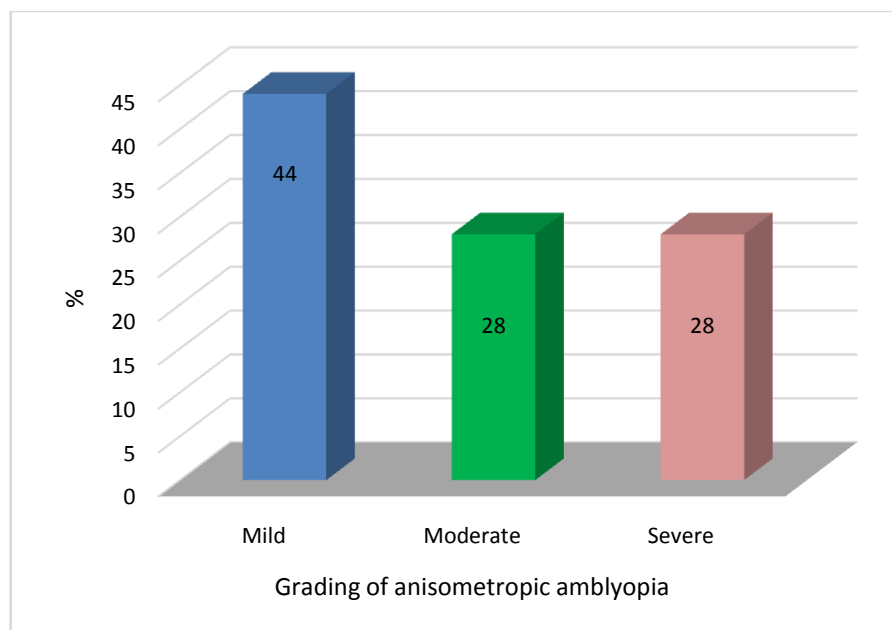
Variable	Mean $\pm$ SD	
Age (Years)	8.00 $\pm$ 1.72	
Gender	Frequency	Percentage
Male	23	46
Female	27	54

n=Total number of participants; Data were expressed as Mean $\pm$ SD, frequency and percentage

Table 2: Distribution of study subjects according to refractive status (n=50)

Types	Frequency	Percentage (%)
Myopia	21	42
Simple	3	6
Compound	18	36
Hyperopia	10	20
Simple	3	6
Compound	7	14
Astigmatism	19	38
Simple	12	24
Compound	7	14

n= Total number of participants; Data were expressed as frequency and percentage



Data were expressed as percentage (%)

Figure-1: Bar chart showing severity of anisometropia (n=50)

Table 3: Distribution of study subject according to severity of amblyopia (n=50)

VA	Degree	Frequency	%
6/9-6/12	Mild	24	48
6/12-6/36	Moderate	17	34
≤ 6/36	Severe	9	18

n= Total number of participants; Data were expressed as frequency and percentage

Table 4: Association of Anisometropia and amblyopia (n=50)

Anisometropia	Amblyopia			Total	p value
	Mild	Moderate	Severe		
Mild	20	1	1	22	
Moderate	3	10	1	14	<0.001
Severe	1	6	7	14	
Total	24	17	9	50	

n= Total number of participants; Data were expressed as frequency and percentage, Chi square test was done

Table 5: Logistic Regression Analysis for severity assessment of anisometropia and amblyopia (n=50)

Anisometropia Vs amblyopia	OR	95% CI	p value
Moderate	0.169	0.024 to 1.169	<0.001
Severe	1.970	1.064 to 3.648	

n= Total number of participants; Odd Ratio (OR), 95% Confident interval (CI)

DISCUSSION

In present study, mean age of the patients were 8 ± 1.72 years. This finding was very much consistent with Lew et al.¹⁰ Anisometric amblyopia can develop after birth over time due to genetics and developmental changes. About 46% of the study subjects were male and 54% were female. Suliman et al.¹¹ exhibited that 53% were male and 47% were female. The minimum disparity in the findings might be due to the reason that data were collected purposively and the female patients were more during sample selection.

In the current study, myopia was observed in 42% cases, hyperopia in 20% and astigmatism was found in 38% cases. Pandey et al.¹² and Patel et al.¹³ informed that their studies with various kinds of anisometropia showed that predominance is more in myopia and astigmatism patients. They demonstrated that myopia patients are bound to have anisometropia. Among all patients, 44% patients had mild anisometropia, 28% had moderate anisometropia and 28% patients had severe anisometropia. However, 48% patients had mild amblyopia, 34% had moderate amblyopia and 18% patients had severe amblyopia. Our study revealed that anisometropia was significantly ($p < 0.001$) associated with amblyopia and it was 2 times more risk for development of severe amblyopia. Abbasi et al.¹⁴ also agreed with our study but their presentation was different from ours. They found 44.4% amblyopia patients among anisometropia. Farooq et al.¹⁵ stated that amblyopia was present in 62.5% of anisometropic eyes.

CONCLUSION

Existing study revealed that anisometropia was an independent predictor for development of amblyopia in children. Therefore, early detection of refractive anisometropia with timely intervention could prevent permanent visual impairment and stereopsis in children. Routine screening programs for screening of anisometropia and amblyopia is to be encouraged in school going children. Recognition and treatment of anisometric amblyopia should be taken up on a priority basis and form another core of the national blindness control program in Bangladesh.

CONFLICT OF INTEREST

There is no conflict of interest.

ACKNOWLEDGEMENT

The authors acknowledge all the study subjects for their active participation.

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