

Comparative Status of Refractive Errors between Male and Female School Going Children

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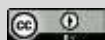


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ABSTRACT

Background: Refractive errors like myopia, hyperopia, and astigmatism can affect a child's academics and well-being. Investigating their occurrence in male and female schoolchildren is vital for equitable eye care and educational policies, sparking interest in pediatric ophthalmology and public health. **Aim of the study:** This study aimed to compare the refractive errors between male and female school-going children. **Methods and Materials:** This observational study took place at Narsingdi Eye Care & Research Centre in Bangladesh from January 2018 to December 2020. It involved 1978 schoolchildren who received detailed eye evaluations and best-corrected visual acuity assessments. Purposive sampling was used, and data analysis was conducted using MS Office tools. **Results:** Among the total participants (N=1978), in males (n=823), myopia was present in 72.1% of cases, while hypermetropia and astigmatism affected 6.7% and 28.7% of individuals, respectively. For females (n=1155), myopia remained prevalent, affecting 75.2% of participants, while hypermetropia and astigmatism contributed to 5.6% and 28.9% of cases, respectively. These findings highlighted the higher prevalence of myopia in both genders, with slightly more occurrence in females. **Conclusion:** The findings emphasize a higher prevalence of myopia in both male and female school-going children, with a slightly more pronounced occurrence in females. Additionally, hypermetropia and astigmatism, while less common, displayed consistent distribution patterns across both genders.

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INTRODUCTION

Refractive errors are the leading cause of visual impairment and the second most significant contributor to preventable blindness ^[1]. Preventable blindness constitutes 80% of all cases of blindness worldwide, with childhood blindness being a particularly concerning issue. Globally, the primary sources of visual impairment are uncorrected refractive errors (such as myopia, hyperopia, and astigmatism) accounting for 43%, cataracts for 33%, and glaucoma for 2% ^[2]. Out of the approximately 19 million visually disabled children, roughly 12 million are affected by refractive errors. The inclusion of uncorrected refractive errors would increase estimates of the global prevalence of visual disability by 61% ^[2]. Globally, approximately 2.3 billion people suffer from refractive errors, with 1.8 billion having access to proper ophthalmic evaluation. However, there remain around 500 million individuals, mainly in developing nations, who lack this access, leading to optical defects that can result in blindness or impaired vision ^[3]. In India, as part of Vision 2020, the prioritized efforts to combat childhood blindness focus on addressing refractive errors, cataract-related amblyopia, and corneal diseases ^[4]. Schools serve as an ideal platform for raising health awareness and early detection of ocular issues ^[5]. Data on childhood blindness prevalence in India is available from certain regions, such as Andhra Pradesh (0.61/1000), West Bengal (0.51/1000), and Delhi (1/1000) ^[5]. Visual impairment in children is often identified during school screening programs conducted under the National Program for Control of Blindness. Notably, uncorrected refractive errors contribute significantly to treatable blindness among children ^[6]. Poor vision in children can significantly impact their classroom participation, hindering education, personality development, and

future career prospects, while also imposing an economic burden on society. The economic costs associated with this burden may vary depending on the type of visual impairment. Therefore, understanding the prevalence and patterns of visual impairment among schoolchildren is essential for shaping effective public health strategies. Around 12.8 million children aged 5-16 are visually impaired due to uncorrected or inadequately corrected refractive errors, with a global prevalence of 0.96% ^[7]. Recognizing the importance of visual needs in children, Vision 2020 - the "right to sight" global initiative, prioritizes childhood blindness ^[8]. Uncorrected refractive errors are prevalent even in high-income countries ^[9]. The objective of this study was to compare refractive errors between male and female school-going children

METHODS & MATERIALS

This prospective observational study was carried out at Narsingdi Eye Care & Research Center in Narsingdi, Bangladesh, spanning from January 2018 to December 2020. The study comprised 1978 school-going children who visited the aforementioned hospital and met the inclusion criteria. A purposive sampling method was utilized to select participants, with a focus on children with various refractive errors identified during post-mydiatic examination. The study included only school-aged children, specifically those aged 7 to 18 years. Exclusion criteria encompassed children with a history of ocular surgery, ocular diseases affecting visual acuity, or manifest strabismus. Informed consent was obtained from all participants before data collection. The study documented demographic and clinical information for all participants, and data analysis and presentation were conducted using Microsoft Office tools.

RESULT

In this study, among the total of 1978 participants, the majority (58.4%) were female and the rest 41.6% were male. The majority of our participants, comprising 90.5% of the group, were older than 8 years, while 9.5% were 8 years or younger. In terms of residence, a significant proportion, 65.8%, hailed from rural areas, while the rest, 34.2%, came from urban locales. In the study, the right eyes of males (n=823) showed excellent BCVA, with 81.5% at 6/6 and 12.8% at 6/9. Among females (n=1155), 85.1% had 6/6 vision, and 10.7% had 6/9 BCVA. Few had lower BCVA, like 6/12 and 6/18, indicating positive visual outcomes in both gender groups. In the left eyes of males (n=823), 83.4% had excellent 6/6 BCVA, and 12.8% had 6/9 BCVA, indicating good vision. For females (n=1155), 86.84% had 6/6 BCVA, while 8.66% had 6/9 BCVA. Few had 6/12 or 6/18 BCVA, highlighting positive visual outcomes in both genders in the study. The distribution of refractive errors in the study population varies slightly between males and females. Among males (n=823), myopia is observed in 72.1% of cases, while hypermetropia and astigmatism affect 6.7% and 28.7% of individuals, respectively. In females (n=1155), myopia remains prevalent, affecting 75.2% of participants, while hypermetropia and astigmatism contribute to 5.6% and 28.9% of cases, respectively. These findings reveal a higher prevalence of myopia in both genders, with a slightly greater occurrence in females. Hypermetropia and astigmatism, though less common, exhibit similar distribution patterns in both male and female participants.

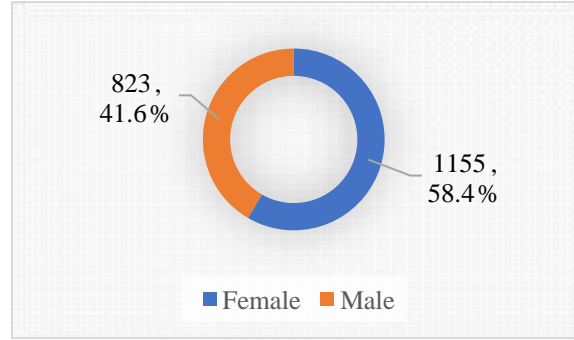


Figure 1: Gender distribution of participants

Table I: Age and residence distribution

Characteristics	n	%
Age		
≤ 8 years	187	9.5%
>8 years	1791	90.5%
Residence		
Rural	1302	65.8%
Urban	676	34.2%

Table II: BCVA distribution of right eyes

BCVA	Male (n=823)		Female (n=1155)	
	n	%	n	%
6/6	671	81.5%	983	85.1%
6/9		12.8%	124	10.7%
6/12	105 18	2.2%	23	2.0%
6/18		2.4%	16	1.4%
6/24	5	0.6%	4	0.3%
6/36	2	0.2%	2	0.2%
6/60	2	0.2%	3	0.3%

Table III: BCVA distribution of left eyes

BCVA	Male		Female	
	(n=823)		(n=1155)	
	n	%	n	%
6/6	686	83.4%	1003	86.84%
6/9		12.8%	100	8.66%
6/12	105 13 12		19	1.65%
6/18		1.5%	19	1.65%
6/24	2	0.2%	5	0.43%
6/36	5	0.6%	6	0.52%
6/60	0		3	0.26%
Total	823	100%	1155	100%

Table IV: Refractive error distribution

Refractive errors	Male		Female	
	(n=823)		(n=1155)	
	n	%	n	%
Myopia	593	72.1%	869	75.2%
Hypermetropia	55	6.7%	65	5.6%
Astigmatism	236	28.7%	334	28.9%

DISCUSSION

This study aimed to compare the refractive errors between male and female school going children. In this study, out of a total of 1978 participants, the majority (58.4%) were female, and the remaining 41.6% were male. A similar study encompassed 2246 primary school children in Saudi Arabia, aged 6 to 14, of both genders [10]. These participants were selected using a multistage sampling method from 30 primary schools situated in three different areas of Al Hassa. Regarding their place of residence, a substantial majority (65.8%) originated from rural areas, with the remaining 34.2% residing in urban locales. A similar pattern was identified in a study by Ahuama and Atowa (1987) conducted in Uganda, where a higher prevalence of refractive error was reported in rural areas, at 29.0%, compared to 21.6% among urban

students [11]. In the study, excellent BCVA was observed in the right eyes of males (n=823), with 81.5% having 6/6 vision and 12.8% at 6/9. Among females (n=1155), 85.1% displayed 6/6 vision, and 10.7% had 6/9 BCVA. Lower BCVA categories like 6/12 and 6/18 were less common in both genders, indicating positive visual outcomes. In the left eyes of males (n=823), 83.4% had excellent 6/6 BCVA, and 12.8% had 6/9 BCVA, representing good vision. For females (n=1155), 86.84% achieved 6/6 BCVA, while 8.66% had 6/9 BCVA. Few had 6/12 or 6/18 BCVA, emphasizing the positive visual outcomes in both gender groups in the study. In a separate study focusing on DMEK surgery, it was reported that the mean best-corrected visual acuity (BCVA) ranged from 20/21 to 20/31, with follow-up durations spanning from 5.7 to 68 months [12]. At the 6-month mark, 37.6% to 85% of eyes achieved a BCVA of 20/25 or better, and 17% to 67% attained a BCVA of 20/20 or better. Slight variations in refractive error distribution were noted between males and females in the study. Among males (n=823), 72.1% had myopia, while 6.7% had hypermetropia, and 28.7% had astigmatism. In females (n=1155), myopia remained prevalent at 75.2%, while hypermetropia and astigmatism affected 5.6% and 28.9% of participants, respectively. The results indicate a higher prevalence of myopia in both genders, with a slightly greater occurrence in females. While myopia is more common, hypermetropia and astigmatism, although less frequent, show similar distribution patterns in both male and female participants. Nisha Dulani and her colleagues made a similar observation in their study, reporting a myopia prevalence of 63.4%, followed by astigmatism at 25.8%, and hypermetropia at 11.35% [13]. Nowadays, examining refractive error occurrence in male and female schoolchildren is essential for promoting equal eye care and educational policies,

generating interest in pediatric ophthalmology and public health. In one study, 22% of males and 15% of females had refractive errors, a statistically insignificant difference (0.297) ^[14]. However, another study found a higher prevalence of refractive errors in females (2.5%, $p = 0.003$) ^[15]. In a separate study, older children exhibited more refractive errors, with males having a higher prevalence (19.51% vs. 11.22%) than females ^[16].

Limitations of the study

This study was conducted at a single center and relied on a relatively small sample size. Additionally, the study was conducted over a short duration. Hence, it's essential to recognize that the study's findings may not comprehensively reflect the broader situation across the entire country.

CONCLUSION & RECOMMENDATION

The study found a significant prevalence of myopia in school-going children, impacting both boys and girls. Myopia, characterized by difficulty seeing distant objects clearly, could affect academic performance and overall well-being. Notably, myopia was slightly more prevalent among girls, suggesting a need for gender-specific eye health strategies. Further research is required to understand the factors contributing to this gender-based difference in myopia. The study also explored hypermetropia and astigmatism in the population. While less common, these refractive errors were consistent among both genders. In summary, these findings emphasize the importance of regular eye screenings and vision care for school children, enabling tailored support for their unique eye health needs.

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