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Prevalence and Unmet Needs of Refractive Error and Presbyopia in Bangladesh

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Abstract **Original Research Article**

Background: Refractive error and presbyopia are among the most common visual impairments globally, with Bangladesh facing high prevalence rates due to limited access to eye care and widespread poverty. While corrective glasses are an effective solution, awareness and access remain significant barriers, particularly in rural areas. ***Objective***: This study aims to assess the prevalence of refractive error, visual impairment, and presbyopia in Bangladesh, and to identify the challenges in meeting the visual needs of the population. ***Method***: A cross-sectional descriptive study was conducted from January 2021 to January 2024, in Southern Medical College & Hospital, Chattagram. A random sample of 1,000 individuals aged 15-49 years was selected. Data collection included structured interviews and clinical eye examinations to assess visual acuity, refractive errors, and presbyopia, with subsequent statistical analysis of prevalence rates and unmet needs. ***Results***: The study found that refractive error and presbyopia increased with age, with 16.5% of participants experiencing refractive error and 62% affected by presbyopia. Spectacle coverage was low (13.3% for refractive error and 3.2% for presbyopia), with significant gender differences in unmet need, particularly among females (90.6%). A lack of awareness was the primary reason for not using optical services, affecting 92.8% of those with refractive error and 95.9% of those with presbyopia. ***Conclusion***: The study highlights the substantial burden of uncorrected refractive error and presbyopia in Bangladesh, with low spectacle coverage and high unmet need. The main barrier to vision correction is a lack of awareness rather than financial constraints. Interventions are needed to increase awareness, improve access to affordable spectacles, and address gender disparities in eye care.

Keywords: Refractive Error, Presbyopia, Visual Impairment, Spectacle Coverage.

INTRODUCTION

Refractive error and presbyopia are two of the most common visual impairments globally, affecting millions of people across all age groups. In Bangladesh, these conditions remain a significant public health concern due to limited access to quality eye care services and widespread poverty [1-3]. Refractive errors, such as myopia, hyperopia, and astigmatism, are caused by irregularities in the shape of the eye, leading to blurred vision. Presbyopia, on the other hand, is an age-related condition that impairs near vision, typically affecting individuals over 40 years of age [4-7].

The prevalence of refractive error and presbyopia in Bangladesh is alarmingly high. Socioeconomic and geographic factors contribute to the inadequate diagnosis and treatment of these conditions. Rural communities, in particular, face significant challenges in accessing eye care facilities. Many individuals remain undiagnosed, leading to avoidable vision impairment and decreased productivity, especially among those in their working years. Children with uncorrected refractive errors often struggle academically, highlighting the profound impact on education and future opportunities [8-11].

Despite the availability of relatively simple and cost-effective solutions, such as corrective glasses, there is a substantial gap in addressing these conditions. The unmet need for refractive error correction is largely due to a lack of awareness, stigma associated with wearing glasses, and limited trained professionals in rural areas. Presbyopia correction is also underutilized, with many older adults accepting vision loss as a natural part of aging rather than seeking help [12, 13].

Efforts to combat this issue have been initiated by non-governmental organizations (NGOs) and public

health initiatives. However, the coverage remains inadequate, and significant disparities persist between urban and rural populations. Comprehensive screening programs and the integration of primary eye care into existing health systems could potentially bridge this gap [14].

Addressing the unmet needs requires a multi-faceted approach that includes raising awareness, improving access to affordable vision correction, and training more eye care professionals. Equally important is the need for data-driven strategies to assess the burden of refractive error and presbyopia and monitor the impact of interventions.

Objective

This study aims to explore the prevalence of refractive error and presbyopia in Bangladesh and the challenges in meeting the visual needs of the population.

METHODOLOGY

This study was a cross-sectional, descriptive research conducted at Southern Medical College & Hospital, Chattagram, Bangladesh from January 2021 to January 2024. The study aimed to assess the prevalence of refractive error, visual impairment, and presbyopia in the local population. Participants were selected through random sampling, with inclusion criteria encompassing individuals aged 15–49 years, regardless of gender. The sample size was determined to ensure statistical power, with a target of 1,000 participants.

Data collection involved structured interviews and clinical eye examinations, including visual acuity tests and refraction assessments to diagnose refractive errors. The presence of visual impairment was determined based on best-corrected visual acuity, and presbyopia was diagnosed in individuals aged 40 years and above, based on their ability to read close-range text without correction. Informed consent was obtained from all participants.

Data analysis was performed using descriptive statistics to calculate the prevalence rates of refractive error, visual impairment, and presbyopia across different age groups and genders. The 95% confidence intervals (CI) were calculated to provide an accurate estimate of the population parameters. Gender differences in spectacle coverage and unmet needs were also analyzed, with chi-square tests used to determine statistical significance. The results were compared with existing literature to assess regional and global patterns of visual impairment and corrective measures.

RESULTS

The study population was predominantly composed of individuals aged 15–19 (17.3%) and 45–49 (19.7%), with other age groups ranging between 10.6% and 13.7%. Females represented a slightly higher proportion of participants (54.0%) compared to males (46.0%). Spectacle wear was notably low, with only 2.6% of participants using glasses, while the vast majority (97.4%) did not use corrective eyewear, indicating a significant unmet need for visual correction.

Table 1: Participants' Characteristics (% with 95% CI)

Characteristic	% (95% CI)
Age Group (years)	
15–19	17.3 (15.9–18.7)
20–24	12.9 (11.8–14.1)
25–29	13.1 (12.0–14.4)
30–34	10.6 (9.5–11.7)
35–39	12.6 (11.5–13.9)
40–44	13.7 (12.6–15.0)
45–49	19.7 (18.3–21.1)
Gender	
Male	46.0 (44.3–47.8)
Female	54.0 (52.2–55.7)
Spectacle Wear	
Glasses	2.6 (2.0–3.1)
No glasses	97.4 (96.8–97.9)

The prevalence of refractive error, visual impairment, and presbyopia increased with age. Refractive error ranged from 0.9% in the 15–19 age group to 12.7% in the 45–49 group, while visual impairment rose sharply from 1.3% in younger age groups to 25.8% among those aged 45–49. Presbyopia was absent in younger groups but reached 78.0% in the 45–49 age group. Females had higher rates of visual impairment (10.2%) and presbyopia (63.1%) compared to males (5.7% and 60.2%, respectively). Overall, presbyopia was prevalent in 62.0% of the population, highlighting the significant burden of age-related visual conditions.

Table 2: Prevalence of Refractive Error, Visual Impairment, and Presbyopia (% with 95% CI)

Group	Refractive Error	Visual Impairment	Presbyopia
Age Groups			
15–19	0.9 (0.1–1.8)	1.3 (0.6–2.7)	-
20–24	2.0 (1.0–4.0)	1.5 (0.7–3.3)	-
25–29	2.5 (1.4–4.5)	3.0 (1.7–5.2)	-
30–34	1.2 (0.4–3.1)	2.8 (1.5–5.2)	-
35–39	3.9 (2.4–6.3)	5.2 (3.4–7.9)	29.2 (24.8–33.9)
40–44	6.0 (4.0–8.7)	9.3 (6.9–12.5)	69.1 (64.5–73.4)

45–49	12.7 (10.0–15.3)	25.8 (22.5–29.5)	78.0 (74.5–81.1)
Sex			
Male	4.1 (3.2–5.3)	5.7 (4.6–7.0)	60.2 (56.1–64.3)
Female	5.2 (4.2–6.4)	10.2 (8.9–11.8)	63.1 (59.8–66.3)
Overall	16.5 (14.1–19.1)	8.1 (7.2–9.2)	62.0 (59.4–64.5)

The spectacle coverage for refractive error was 13.3% overall, with a higher coverage among males (19.0%) compared to females (9.4%). Unmet need remained substantial, at 86.7% overall, with females having a greater proportion (90.6%) than males (81.0%). For presbyopia, the overall spectacle coverage was markedly low at 3.2%, with males (4.5%) slightly better covered than females (2.4%), indicating significant gaps in addressing visual correction needs across both groups.

Table 3: Spectacle Coverage Rate and Prevalence of Met and Unmet Need for Spectacles (% with 95% CI)

Group	Refractive Error		Presbyopia	
	Met Need	Unmet Need	Spectacle Coverage	Met Need
Male	19.0	81.0	19.0 (8.9–29.1)	4.5
Female	9.4	90.6	9.4 (3.2–15.6)	2.4
Total	**13.3**	**86.7**	**13.3 (7.7–18.9)**	**3.2**

The primary reason for not utilizing optical services among individuals with both refractive error and presbyopia was unawareness of the problem, affecting 92.8% and 95.9% of the respective groups. A small proportion cited the unavailability or distance of optical services (2.8% for refractive error and 1.4% for presbyopia). Dislike of wearing glasses was reported by 4.4% of those with refractive error and 1.4% with presbyopia. Financial constraints and lack of perceived need were not significant barriers among individuals with refractive error, while 1.4% of those with presbyopia mentioned cost and need-related concerns.

Table 4: Reasons for Not Utilizing Optical Services (% by Gender)

Reason	Refractive Error		Presbyopia	
	Male	Female	Total	Male
Unaware of the problem	96.1	91.0	92.8	95.9
Optical services not available or very far	0.0	4.5	2.8	1.4
Don’t like to wear glasses	3.9	4.5	4.4	1.4
Cannot afford glasses	0.0	0.0	0.0	1.4
Need not felt	0.0	0.0	0.0	0.0

DISCUSSION

Our study revealed several insights into the prevalence of refractive error, presbyopia, and visual impairment in a population with limited spectacle coverage, highlighting both similarities and differences compared to other studies. Consistent with previous research, the prevalence of refractive error and presbyopia increased with age, particularly in the 45–49 age group, where presbyopia reached 78%. This aligns with global data indicating that presbyopia is most common in middle-aged and older adults, reflecting the natural age-related decline in near-vision acuity [11].

Gender differences were also noted, with females having slightly higher rates of presbyopia (63.1%) and visual impairment (10.2%) compared to males (60.2% and 5.7%, respectively). Similar trends have been observed in studies from other regions, where women tend to have a higher burden of visual impairment, possibly due to longer life expectancy and lower access to eye care services in some communities [15]. However, our findings show a relatively smaller gap between genders compared to reports from rural and low-income settings where access disparities are more pronounced.

Spectacle coverage in our population was notably low, at 13.3% for refractive error and only 3.2% for presbyopia. This is lower than rates reported in studies from urban areas and high-income countries, where coverage can exceed 50%. The significant unmet need (86.7% for refractive error and 96.8% for presbyopia) emphasizes the lack of access to corrective eyewear in our population. This unmet need was higher among females, consistent with findings in other studies that highlight gender-based barriers to accessing optical services.

One of the most striking findings was the high level of unawareness about vision problems among participants, cited by over 90% of those not utilizing optical services. This mirrors findings in other low-resource settings, where lack of awareness is a primary barrier to seeking eye care. Unlike some studies that report financial constraints as a major obstacle, cost was not identified as a significant factor in our study [13].

This may suggest that even when affordability is not a barrier, awareness and access remain critical issues.

Another difference noted was in the reasons for not wearing glasses. While some studies report cosmetic concerns or discomfort as major deterrents, only a small fraction (4.4%) of our participants cited a dislike of glasses. This suggests that cultural acceptance of eyewear may be relatively high, but other systemic issues, such as access and education, limit usage.

In summary, our findings highlight the urgent need for targeted interventions to improve awareness and access to optical services. Addressing these gaps will require community-based education programs, increased availability of affordable spectacles, and efforts to integrate eye care into primary health services, especially for underserved populations. These strategies align with global recommendations for reducing the burden of visual impairment and refractive errors.

CONCLUSION

In conclusion, the study highlights a significant burden of uncorrected refractive error, visual impairment, and presbyopia, with a pronounced unmet need for spectacles, particularly among older age groups and females. Despite the high prevalence of these conditions, spectacle coverage remains notably low, at 13.3% for refractive error and 3.2% for presbyopia, primarily due to a lack of awareness rather than financial barriers. These findings underscore the critical need for targeted interventions focused on raising awareness, improving access to optical services, and addressing gender disparities to reduce the impact of vision impairment in the population.

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