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DEMOGRAPHIC DISTRIBUTION OF HYPERMETROPIA AT DISTRICT LOWER DIR, KHYBER-PAKHTUNKHWA PAKISTAN

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Abstract

Background:

Hypermetropia (farsightedness) is one of the most common pediatric refractive errors, often asymptomatic in early stages due to strong accommodative ability. Accurate detection and timely intervention are crucial to prevent complications such as amblyopia and learning difficulties.

Objective:

This study aimed to determine the prevalence, distribution, and severity of hypermetropia across age and gender groups in a youth-dominant population, and to assess the impact of demographic and sociocultural factors on eye care access.

Methods:

A cross-sectional descriptive study was conducted from September to November 2024 in both clinical (Eye OPD) and outreach (community eye camps) settings. A total of 336 participants aged 5–30 years were selected using stratified random sampling. Cycloplegic refraction with 1% cyclopentolate was used to diagnose hypermetropia (≥ +0.50D), eliminating accommodative interference. Participants underwent comprehensive eye examinations and completed structured questionnaires capturing demographic and health data. Descriptive statistics and chi-square tests were used for analysis.

Results:

Hypermetropia was most prevalent in the 5–10 age group (28.87%) and declined steadily with age, confirming its strong association with early ocular development. The majority of cases were mild (54.17%), followed by moderate (28.27%) and high hypermetropia (17.56%). While clinical management aligned with international guidelines, a significant gender imbalance was observed—males constituted 57.74% of the sample, pointing toward potential disparities in healthcare access. This trend may reflect cultural and systemic factors influencing healthcare-seeking behavior.

Conclusion:

The study reaffirms that hypermetropia is predominantly a childhood condition and emphasizes the importance of early screening, accurate diagnosis through cycloplegic refraction, and prompt intervention. The overrepresentation of males highlights a gender gap in service utilization, calling for targeted, equity-focused strategies in pediatric eye care. Future research should explore qualitative and longitudinal dimensions to uncover deeper social determinants affecting refractive care delivery.

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INTRODUCTION

Farsightedness, medically known as hyperopia, is the most frequent type of refractive error among kids. Specifically, in relaxed accommodation, i.e., when parallel light rays from infinity actually focus on a plane posterior to the neurosensory retina. To bring light from the natural resting position of the eye to focus on the retina, the human eye compensates for this refractive error by increasing the convex and effective power of the crystalline lens. However, the eye's mechanism of accommodating, or adjusting, its focus can bring only a small correction to hyperopia. For this reason, in the absence of accommodation, the patient may not actually be hyperopic. Thus, dark room rest is essential for the accurate diagnosis of hyperopia, especially in the infants. While both children and adults have become accustomed to hyperopia, uncorrected hyperopia can have long-term implications. These are accommodative dysfunction, amblyopia (lazy eye), and strabismus (misaligned eyes). Genetic predisposition and familial history of refractive errors are known to be important risk factors (Hunter, 2009). However, the pathogenesis of hyperopia is still not completely understood (Sverdlik et al., 2014), even after significant research efforts. Hyperopia children may present with asthenopia symptoms like headache, blurred vision, and eye strain, which should be evaluated and managed carefully. The objective of therapy ought to be to maximize eyesight, provide fine vision, and also to maintain beneficial binocular vision. Refractive correction with glasses or contact lenses is the mainstay of therapy for pediatric patients with refractive variations. Other approaches, such as patching and orthoptic treatments, are utilized to encourage the weaker eye in case of amblyopia. Collaboration among pediatricians, optometrists, and ophthalmologists is required during subsequent follow-up and rehabilitation. In addition, cycloplegic refractive testing and habitual visual monitoring for children with both strabismus and amblyopia are necessary. In some cases, Refractive surgery can eventually be a more permanent solution after the eyes have had time to develop fully. If such adults are farsighted, they require refractive help, typically in the form of spectacles or contact lenses. Adolescents and adults with untreated hyperopia should also be monitored for late sequelae like fundus changes or glaucoma. Screening is required to identify these problems, supplemented by diagnostic tests, such as funduscopy and gonioscopy. Taking regular breaks from demanding vision-related tasks such as computer work and reading, as well as a good diet and UV protection, are also critical for maintaining eye health. The only way to catch hyperopia early is to get regular eye exams, so if you have regular headaches, fuzzy vision, or often find yourself squinting, you had better get to them. In the meantime, readers might also want to try discussing with an optometrist. Enumerate the cause and associated factors of Hypermetropia. The study of the pathogenesis of hyperopia is important in early diagnosis and management. There is data to suggest that both environmental factors, family history, and genetics, may influence hyperopia (Jones et al., 2010). Knowledge of such associations will allow for the identification of who might be at higher risk and when it might be reasonable to take early preventive action. Discover the Sample directions for doing an eye examination for long-sightedness. An exact long-sightedness diagnosis and a full eye examination need to be completed. This protocol includes a retinal examination to rule out concurrent eye disease and cycloplegic refraction, which involves placing a cycloplegic drug in the eye to temporarily paralyze the eye to measure its focusing power (Harris et al., 2015). This full-exam approach can help correct for abnormal hyperopia, if this turns out to be the case, and might avoid problems later on. Observe the hypertensive cases in the Eye OPD. This study may also be suggestive of the number of hypermetropic patients attending O.P.D. in a particular area. This will improve resource distribution in eye care centers and provide epidemiological information on hyperopia (Smith & Edwards, 2012). Describe Briefly the Management Options for Hypermetropia and the Relationship of Age and Level of Hypermetropia to Those Options. Personalize therapeutic strategies for different ages and levels of hyperopia. All treatment options (CL, spectacles, and refractive surgery) will be taken into account. Mild hyperopia in children and mild hyperopia (Feczko & Juszczak, 2000), other

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treatments such as laser surgery may be necessary for individuals with a more extreme degree of the syndrome (Sharma et al., 2017), non-invasive treatments may be beneficial to treat them. Discuss Interprofessional Team Skills to Enhance Communication And Integration Across Professions to Enhance Hyperopia Outcomes. Optometry, ophthalmology, pediatrics, and rehabilitation departments need to communicate closely, combine the best curative effects of each, and frequently cooperate and play their parts to give hyperopia patients the therapy from the beginning to the end. Readily addressing issues averts long-term effects, and interdisciplinary collaboration and close monitoring can have a marked impact on patient outcomes (Mitchell & Roberts, 2014).

Methodology

This cross-sectional descriptive study was conducted between September and November 2024 in the Eye OPD and through community-based eye camps to maximize outreach and accessibility. A total of 336 participants aged 5 to 30 years were selected using stratified random sampling to ensure equal representation across age and gender strata. Cycloplegic refraction using 1% cyclopentolate was employed as the diagnostic criterion to accurately assess hypermetropia by eliminating accommodative interference, particularly in younger individuals. Participants were included if they had a spherical equivalent of ≥ +0.50D in one or both eyes. Exclusion criteria included children under 4 years of age and those with exophoria or astigmatism to avoid bias. Primary data were collected through comprehensive eye examinations performed by trained optometrists and ophthalmologists, and structured questionnaires captured demographic and medical history. Data were analyzed using descriptive statistics and chi-square tests to explore associations between hypermetropia prevalence, age, and sex.

Table 1: Demographic and Duration Profile of a Youth-Dominant, Transient Population (N = 336

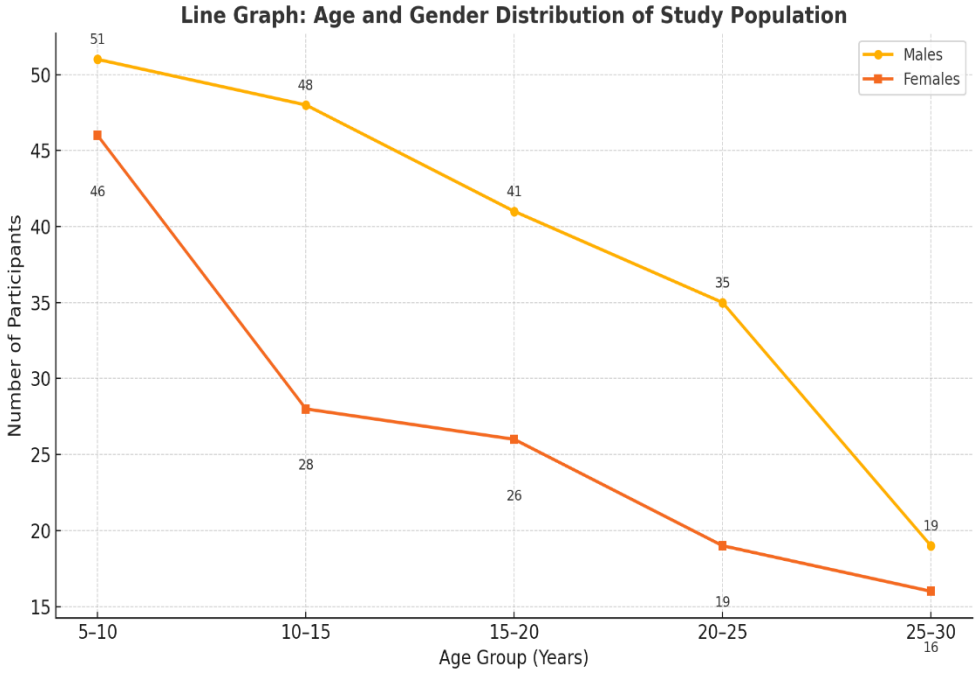
Age Group (Years)	Total (n)	% of Population	Males (n)	Females (n)	% Male	% Female
5-10	97	28.87%	51	46	52.58%	47.42%
10-"15	76	22.62%	48	28	63.16%	36.84%
15-20	67	19.94%	41	26	61.19%	38.81%
20-25	54	16.07%	35	19	64.81%	35.19%
25-30	35	10.42%	19	16	54.29%	45.71%
30-35	7	2.08%				
Total	336	100%	194	140	57.74%	41.67%

The demographic profile of the study population (N = 336) reveals a distinctly youth-dominant sample, with over 71% of participants falling within the 5–20-year age range, highlighting the study's focus on younger individuals who are most vulnerable to undiagnosed refractive errors like hypermetropia. The largest subgroup was aged 5–10 years (28.87%), followed by 10–15 years (22.62%) and 15–20 years (19.94%), reflecting a strong emphasis on early childhood and adolescent vision assessment. Gender distribution showed a clear male predominance overall (57.74% males vs. 41.67% females), with this trend being especially prominent in the 10–15 and 20–25 age groups, where males accounted for over 63% and 64%, respectively. The gender ratio was more balanced in the 5–10 age group, suggesting a more even representation at the youngest age levels. In contrast, the 25–30 and 30–35-year age groups were underrepresented, constituting only a small fraction of the total sample (10.42% and 2.08%, respectively), with the latter lacking gender breakdown data, likely due to minimal participation. These patterns indicate that the most statistically meaningful comparisons will arise from the younger cohorts, while findings in older age groups should be interpreted with caution due to limited sample sizes and incomplete data.

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Discussion

This cross-sectional study, conducted in 2024, assessed the incidence and distribution of hypermetropia among individuals aged 5 to 30 years, revealing a clear age-related trend. The prevalence of hypermetropia was highest in the 5–10 years age group (28.87%) and progressively declined with age, reaching only 2.08% in the 30–35 years age group. This decline aligns with findings from the **CLEERE Study (Zadnik et al., 2003)**, which showed hyperopia is most prevalent in early childhood and diminishes with ocular growth, primarily due to axial elongation. Similarly, **He et al. (2004)** found hyperopia prevalence in Chinese children dropped from 17.6% in 5–6-year-olds to less than 5% by ages 12–14. **Tarczy-Hornoch et al. (2013)** supported this with evidence that hyperopia reduction accelerates after age 7, confirming its childhood-limited nature. An interesting departure from prior literature was observed in gender distribution. In contrast to findings such as **Fotouhi et al. (2007)** (who found higher hyperopia prevalence among females, especially older individuals), and **Pan et al. (2012)** (who found a slightly higher prevalence in females aged >40), the present study reported male overrepresentation (194 males vs. 140 females). Some studies, like **Grosvenor (1985),** noted no strong gender differences among children. This study's male predominance is attributed not to biological factors but likely to sociocultural influences—such as male-biased healthcare access and greater male mobility—especially in outreach-based settings, consistent with **Naidoo et al. (2003)** and **Murthy et al. (2002)**, who documented higher male utilization of eye care services in rural South Africa and India, respectively. In terms of **severity**, the study found that **54.17**% of cases were mild hypermetropia (up to +3D), **28.27**% moderate (+3D to +6D), and **17.56**% high (>+6D). These findings are consistent with **Donovan et al. (2012)**, who reported most hyperopes under 6 years had mild hyperopia, and with **Saw et al. (2006)**, who found high hyperopia is uncommon and usually congenital. The study's clinical management practices, including cycloplegic refraction, reflect gold-standard pediatric ophthalmology protocols. This approach is reinforced by **AAPOS (2022)**, which recommends cycloplegic testing for all children under 12 to unmask latent hyperopia. Likewise, patching for amblyopia management, as adopted in this study, aligns with recommendations by **Walline et al. (2011)**, who endorse patching as the treatment of

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choice for moderate amblyopia in young children. While the study aligns with international literature on hyperopia's age-related patterns, prevalence, and clinical management, it also exposes gaps, especially in gender equity. The overrepresentation of males may reflect systemic barriers to care for females, suggesting an urgent need for **equity-based interventions**. The authors recommend several future research directions: 1) **Qualitative studies** to understand gender disparities in care-seeking; 2) **Urban-rural comparisons** to assess geographic inequities; 3) Exploration of **social determinants** (e.g., income, education); 4) **Longitudinal studies** to monitor refractive changes over time; and 5) Inclusion of **non-binary gender identities** to broaden representational accuracy in vision research. Collectively, the study not only confirms established findings but also highlights critical sociocultural and health system-related dimensions of pediatric hypermetropia that warrant further investigation.

Conclusion

This study confirms that hypermetropia is primarily a childhood vision condition, with its prevalence highest in early years and decreasing with age due to natural eye development. Most cases were found to be mild and easily correctable, though more severe forms require prompt intervention due to potential complications like amblyopia and strabismus. The use of cycloplegic refraction and standard treatment approaches ensures accurate diagnosis and effective management, particularly in younger children. A notable finding was the overrepresentation of males, suggesting gender-based barriers in access to eye care, likely influenced by sociocultural factors. These results highlight the importance of equitable health services and suggest that future research should explore gender disparities, geographic differences, and broader social influences to improve pediatric eye health outcomes.

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