



PATTERNS OF REFRACTIVE ERROR IN A RURAL SETTING HOSPITAL BASED STUDY

Ophthalmology

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ABSTRACT

Introduction: Refractive error is one of the most common causes of visual impairment around the world. Hence knowledge of the types and pattern of refractive errors would be helpful in planning public health strategies.

Aims and Objectives: To determine the pattern of refractive errors in patients attending the outpatient department of Ophthalmology Civil hospital, Palampur .H.P.

Materials and Methods: The present hospital-based prospective study was conducted in the Department of Ophthalmology Civil hospital, Palampur .H.P. Patients who had refractive error of at least 0.5 D but not having other diseases in the eye responsible for reduced vision were included for the study.

Results: During the study period of 1 year, 685 patients were included in the study on the basis of inclusion and exclusion criteria. Among 685 patients, 299 (43.64 %) were males and 386 (56.35 %) were females. Overall, myopia was the most common refractive error occurring with a frequency of 35.77% in the study population. This was followed by hypermetropia with a frequency of 25.25%; followed by simple myopic astigmatism (17.37%). Females predominated among myopic and males predominated among hypermetropics. The majority of spherical errors was less than or equal to 2 D. Myopia showed an increasing trend up to the 25 years of age, and then decreased progressively. Hypermetropia decreased from an early childhood peak till about 35years of age and then showed an increasing trend. "Astigmatism with the rule" was more common than "astigmatism against the rule", irrespective of age.

Conclusion: Refractive errors progressively shift along myopia up to the third decade and change to hypermetropia till the sixth decade.

KEYWORDS

INTRODUCTION

Refractive errors (REs) are common in children and is the most common cause of visual impairment globally and the second most common cause of treatable blindness.¹ An impairment of vision is defined as a patient having best corrected visual acuity less than 6/18 in better eye. Blindness is defined by WHO as visual acuity less than 3/60 with best possible correction in the better eye on Snellen visual acuity chart. Refractive errors remained most important cause of visual impairment in childhood worldwide and contribute for about 19% of total blindness in the world.² Uncorrected refractive errors are an important cause of blindness and visual impairment in many countries. In developing countries however, it is often difficult to provide efficient refraction services for a variety of reasons, and this results in a high prevalence of uncorrected refractive errors in these regions.³ Refractive errors may appear throughout childhood and adolescence. If refractive errors are left untreated they can result in amblyopia and strabismus.⁴ So there is a priority need to control and treat these disorders. For this, information about the pattern of refractive errors in the population is essential.

MATERIAL AND METHODS

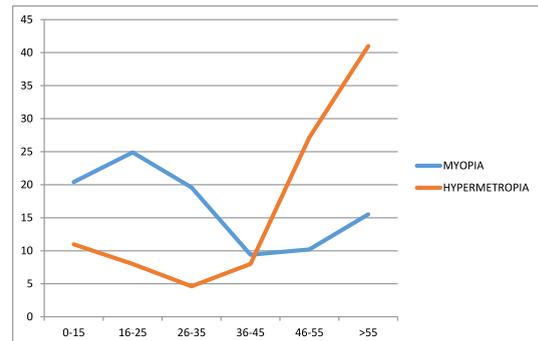
The present hospital-based prospective study was conducted in the department of Ophthalmology, civil hospital Palampur, H.P. Patients who presented during the study period (September 2019 to august 2020) and had a refractive error of at least 0.5 D were included for the purpose of the study. Patients having other diseases in the eye responsible for decreased vision were excluded from the study. All the patients underwent subjective refraction (except for preverbal children where objective correction was given based on retinoscopy, child's age and presence or absence of squint). Cycloplegic refraction was done in preverbal children, uncooperative and mentally retarded patients. Cycloplegic drugs used were 1% cyclopentolate, 1% atropine ointment, and 1% tropicamide. Classification of the patients was done on the basis of final prescription after subjective refraction or retinoscopic correction in case of pre-verbal children. Myopia was defined as refractive error of -0.5 D or more and high myopia as a diopter power of 6.0 D or more. Hypermetropia was defined as a refractive error of at least $+0.5$ D. Astigmatism "with the rule" was defined as myopic astigmatism at $180 \pm 20^\circ$ or hypermetropic

astigmatism at $90 \pm 20^\circ$ and "against the rule" as myopic astigmatism at $90 \pm 20^\circ$ or hypermetropic astigmatism at $180 \pm 20^\circ$. Astigmatism at $>20^\circ$ to $<70^\circ$ or $>110^\circ$ to $<160^\circ$ was considered as oblique astigmatism.

RESULTS

Among 685 patients included in the study, 299 (43.64 %) were males and 386 (56.35 %) were females. Myopia was more common in women than men (60.40% in women vs. 39.59% in men). Hypermetropia was more common in men than women (54.33% in men vs. 45.66% in women). Overall, myopia was the most common refractive error occurring with a frequency of 35.77% in the study population. This was followed by hypermetropia with a frequency of 25.25%; followed by simple myopic astigmatism (17.37%).

Myopia showed an increasing trend up to the 25 years of age, and then decreased progressively. Hypermetropia decreased from an early childhood peak till about 35years of age and then showed an increasing trend. Myopic astigmatism and other refractive errors showed a fairly constant distribution in all age groups.



In 267 patients with astigmatism, 117 (43.82%) had against the rule astigmatism, 150 (56.18%) had with the rule astigmatism. "Astigmatism with the rule" was more common than "astigmatism against the rule", irrespective of age.

| Age (years) | Myopia | Hypermetropia | Simple myopic astigmatism | Simple hypermetropic astigmatism | Compound myopic astigmatism | Compound hypermetropic astigmatism | Mixed |
|-------------|------------|---------------|---------------------------|----------------------------------|-----------------------------|------------------------------------|-----------|
| 0-15 | 50(20.41%) | 19(10.98%) | 13(10.92%) | 1(7.14%) | 19(18%) | 2(13.33%) | 2(14.28%) |

| | | | | | | | |
|--------|-------------|-------------|-------------|-----------|-------------|-----------|-----------|
| 16-25 | 61(24.9%) | 14(8%) | 22(18.49%) | 3(21.43%) | 29(27.62%) | 3(20%) | 3(21.42%) |
| 26-35 | 48(19.59%) | 8(4.62%) | 32(26.89%) | 4(28.57%) | 25(23.8%) | 1(6.67%) | 4(28.57%) |
| 36-45 | 23(9.39%) | 14(8%) | 22(18.49%) | 2(14.28%) | 19(18%) | 3(20%) | 3(21.42%) |
| 46-55 | 25(10.2%) | 47(27.17%) | 17(14.28%) | 2(14.28%) | 7(6.67%) | 4(26.67%) | 1(7.14%) |
| >55 | 38(15.51%) | 71(41%) | 13(10.92%) | 2(14.28%) | 6(5.71%) | 2(13.33%) | 1(7.14%) |
| Total | 245(35.77%) | 173(25.25%) | 119(17.37%) | 14(2%) | 105(15.33%) | 15(2.19%) | 14(2%) |
| Male | 97 | 94 | 53 | 1 | 44 | 4 | 6 |
| Female | 148 | 79 | 66 | 13 | 61 | 11 | 8 |

DISCUSSION

In our study, refractive error was more in females (56.35%) than males (43.64%). This could be due to more female patients with refractive error. Similar reports seen Qatar with prevalence of refractive error in females of 23.7% and males 15.5%⁶, another study with similar reports in India is by Prema et al with 17.2% females and 13.4% males.^{5,7}

In our study, myopia was more common than hypermetropia followed by simple myopic astigmatism.

Myopia and myopic astigmatism was more common among youngsters below 35 years of age while hypermetropia and hypermetropic astigmatism was more common in those above 40 years of age. Myopia followed an increasing trend up to 25 years of age followed by descend up to 55 years and an increase in number after 55 years of age. In present study prevalence of astigmatism is slightly higher (Myopic astigmatism 17.37% and Hypermetropic astigmatism 2%). Similar results have been reported from Qatar (70%) (Al-Naimi et al., 2010)¹⁰, Ghana (49.3%) (Ovenseri-Ogbomo & Assien, 2010)¹¹

The prevalence of myopia increases in early adulthood was relatively stable from the early 20s to age 50 years and then declined after age 50 years. Several recent studies document a declining prevalence of myopia with age in adults. The Beaver Dam Eye Study reported that the prevalence of myopia declined from 42.9% in those 43 to 54 years of age to 14.4% in those 75 years of age or older.⁸

In our study, myopia was more common in women than men (60.40% in women vs. 39.59% in men). In a multivariate analysis done by Dayan et al,⁹ it was found that female gender, 12 years of education, and non-Israeli origin (either Western or Eastern origin, as defined in the Methods section) are independent risk factors for myopia.

Similarly, the pattern of shift toward hypermetropia was consistent with many other studies. In our study hypermetropia declines up to 35 yrs of age and then shows an increasing trend.

The possible explanation cited is the decrease in the power of the aging lens, either due to a decrease in the curvature of its surface as it grows throughout life or an increase in the density of the cortex that makes the lens more uniformly refractive.³

CONCLUSION

Present study shows that myopia, hypermetropia, and type of astigmatism have different distribution indifferent age group like myopia is more common in younger population and hypermetropia is more common in older age group.

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