Original Article   Refractive Errors

Prevalence of Different Refractive Errors and their Relation to Age and Sex in Patients Presenting in the Outpatient Department of Ophthalmology at Dow University of Health Sciences

1. Abdul Rasheed 2. Saba Alkhairy 3. Farnaz Siddiqui 4. Mazhar ul Hassan

1. Prof. of Ophthalmology, DUHS, Karachi 2. Asstt. Prof of Ophthalmology, DUHS, Karachi 3. Asstt. Prof of Ophthalmology, DUHS, Karachi 4. Asstt. Prof of Ophthalmology, DUHS, Karachi

ABSTRACT

Objective: To see the prevalence of different refractive errors and their relation to age and sex in patients presenting in the Outpatient department of Ophthalmology at Dow University of Health Science.

Study Design: Cross sectional study

Place and duration of study: This study was carried out at the out-patient department of Ophthalmology Dow University of Health Science (OJHA campus), Karachi Pakistan from January 2011 to June 2011.

Materials and Methods: Total of 691 patients were included in the study. The testing and examination protocol included visual acuity measurement using Snellen and E chart after auto refraction, cycloplegic retinoscopy in children and examination of anterior segment and fundus in all patients.

Results: Mean age was 42.11 ± 17.35 years. Males were 323 and females were 368 in number. The most frequent refractive error was Myopia which was found in 153 (22.1%) patients and the second frequent refractive error was Myopic Astigmatism at a frequency of 148(21.4%);p value was 0.037.Thus Myopia and myopic astigmatism were the most frequent refractive error in age group ranging from 05-75 years.

Conclusion: In our study we found Myopia to be the most common refractive error (n=153 22.1%) followed by Myopic Astigmatism (n=148 21.4%). Myopia and Myopic Astigmatism were seen in males more than females while hypermetropia, hypermetropic astigmatism and mixed astigmatism were seen in more in females as compared to males.

Key Words: refractive error, myopia, myopic astigmatism

INTRODUCTION

Uncorrected refractive errors are a common cause of visual impairment worldwide that can be prevented.[1]World Health Organization introduced the global initiative for the elimination of avoidable blindness by the year 2020 known as "Vision 2020". An estimated 1.5 million children are blind worldwide of whom 1 million live in Asia.[2]Refractive errors which account mostly for low vision and visual handicap are the third largest cause of preventable/curable blindness in Pakistan.[3] Correction of refractive error is cheap and effective with corrective spectacles and results in high functional improvement.[4] People who access treatment for refractive error generally are not disabled thus it is the most important factor for the elimination of avoidable blindness. [5]

Myopia and hypermetropia are types of Refractive

Correspondence: Prof. Dr. Abdul Rasheed
Prof. of Ophthalmology, DUHS, Karachi
Contact: 0333-2152180
Email: rdadbdulrasheed@hotmail.com

errors that bring the focus ofparallel rays of light entering the eye in front of, or behind the fovea respectively. Astigmatism occurs when the optical systemis not symmetric about the optical axis, this aberration being dueto irregular curvature of the cornea or the lens. The prevalenceof the different types of RE vary considerably across differentpopulation groups and by age.

The onset of refractive error as compared to cataract is earlier and thus it can account for twice as many blind persons per year. It has severe social and economic effects on individuals and communities, restricting educational and employment opportunities of otherwise healthy individuals.[6]

Although numerous studies of refractive error have been performed, most were in settings of unknown representation, and because of different measurement methods and nonuniform definitions, comparisons of data are difficult.[7]The purpose of this study was to find the frequency of refractive errors in relation to age and sex and to further identify their types, suggest guidelines for early diagnosis and treatment and to promote general awareness.

MATERIALS AND METHODS

In this study 691 patients visiting ophthalmology outpatient department of Dow University of health Science were evaluated from January 2011 to June 2011. History was taken in detail about duration of symptoms as well as their complaints regarding decrease in vision. The testing and examination protocol included visual acuity measurement using Snellen and E chart after auto refraction, cycloplegic retinoscopy in children and examination of anterior segment and fundus in all patients. The cycloplegic retinoscopy was performed such that 3 drops of cyclopentolate 1% were administered, 3 times, 5 minutes apart to each eye and after 45 minues cycloplegic refraction was performed. Cycloplegic refraction was performed using a streak retinoscope in a semidark room.

Records of patients with any adnexal, anterior segment and posterior segment pathology were not included in the analysis. Records of patients less than five and more than eighty years were also excluded.

Data were collected by practicing optometrists and ophthalmologists experienced in the study measurements and interview techniques. Data quality was insured via training of data collectors, supervision and cross-checking by supervisors. Data were entered into a computerized database using SPSS version 17.0. We applied chi-square test to study the relationship between Gender and Refractive error.

RESULTS

Total of 691 patients were included in the study. Mean age was 42.11 (SD 17.35) .In age group 5-15 years there were 63 patients, in age group 16-30 years there were 130, 31-45 years age group had 179, 46-60 years age group had 223 and 61-75 years had 93 patients (Table 2). Out of 691 patients 323 were males and 368 were females. In males the most frequent refractive error was Myopia which was found in 86 (26.6%) while in females the most frequent refractive error was hypermetropia seen in 83 (22.6%).The second frequent refractive error in both sexes was Simple Myopic Astigmatism .In males it was seen in 67(20.7%) individuals and in females it was found to be present in 81(22.0%) individuals. The frequency of different refractive errors is given in Table 1.

Table No.1: Relationship of Refractive Errors to Gender

| Gender	Refractive Errors							Total	P-value
	Myopia	Hyper-metropia	Myopic Astigmatism (Simple)	Myopic Astigmatism (Compound)	Hypermetropic Astigmatism (Simple)	Hypermetropic Astigmatism (Compound)	Mixed Astigmatism		
Male	86 (26.6%)	61 (18.9%)	67 (20.7%)	44 (13.6%)	19 (5.9%)	31 (9.6%)	15 (4.6%)	323 (100.0%)	
Female	67 (18.2%)	83 (22.6%)	81 (22.0%)	41 (11.1%)	22 (6.0%)	54 (14.7%)	20 (5.4%)	368 (100.0%)	0.076
Total	153 (22.1%)	144 (20.8%)	148 (21.4%)	85 (12.3%)	41 (5.9%)	85 (12.3%)	35 (5.1%)	691 (100.0%)	

To see the relationship between Gender and Refractive errors we have applied Chi-square test and p-value suggest that there is no difference between male and female on the basis of refractive errors. It is nearly be associated if sample size increased.
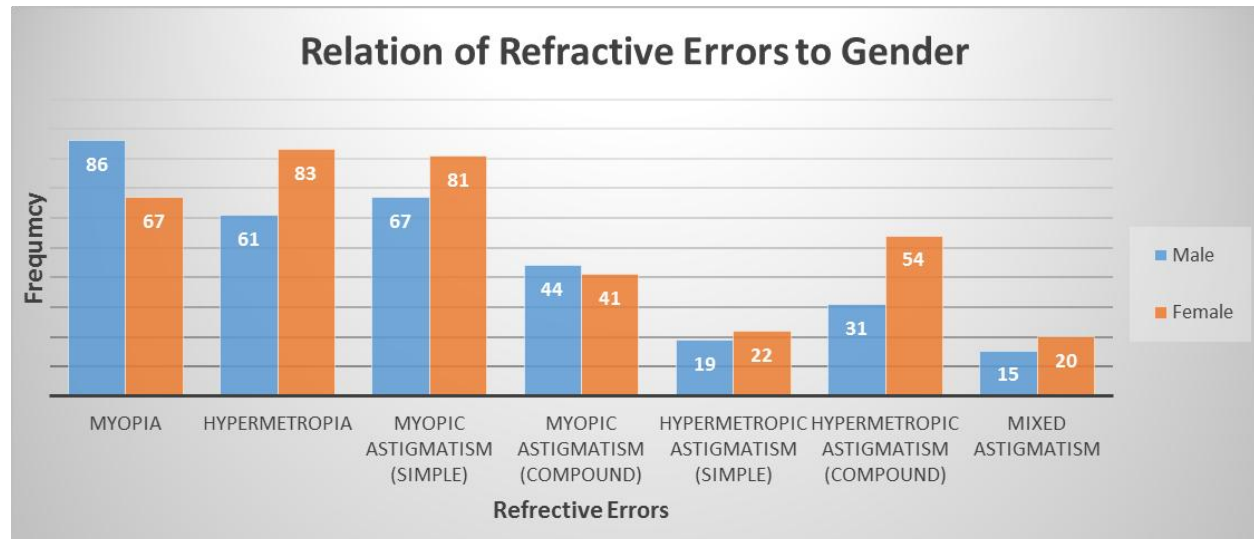
Graph No.1: Relation of refractive errors to gender

Table No.2: Relationship of Refractive Errors to Age Group

Age Group	Refractive Errors							Total
	Myopia	Hyper-metropia	Myopic Astigmatism (Simple)	Myopic Astigmatism (Compound)	Hypermetropic Astigmatism (Simple)	Hypermetropic Astigmatism (Compound)	Mixed Astigmatism	
5 – 15	26 (41.3%)	8 (12.7%)	13 (20.6%)	6 (9.5%)	1 (1.6%)	7 (11.1%)	2 (3.2%)	63 (100.0%)
16 – 30	52 (40.0%)	8 (6.2%)	37 (28.5%)	20 (15.4%)	4 (3.1%)	6 (4.6%)	3 (2.3%)	130 (100.0%)
31 – 45	39 (21.8%)	41 (22.9%)	47 (26.3%)	24 (13.4%)	5 (2.8%)	16 (8.9%)	7 (3.9%)	179 (100.0%)
46 – 60	28 (12.6%)	75 (33.6%)	34 (15.2%)	23 (10.3%)	16 (7.2%)	35 (15.7%)	12 (5.4%)	223 (100.0%)
61 – 75	8 (8.6%)	11 (11.8%)	16 (17.2%)	12 (12.9%)	15 (16.1%)	20 (21.5%)	11 (11.8%)	93 (100.0%)
76 and above	0 (0.0%)	1 (33.3%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	1 (33.3%)	0 (0.0%)	3 (100.0%)
Total	153 (22.1%)	144 (20.8%)	148 (21.4%)	85 (12.3%)	41 (5.9%)	85 (12.3%)	35 (5.1%)	691 (100.0%
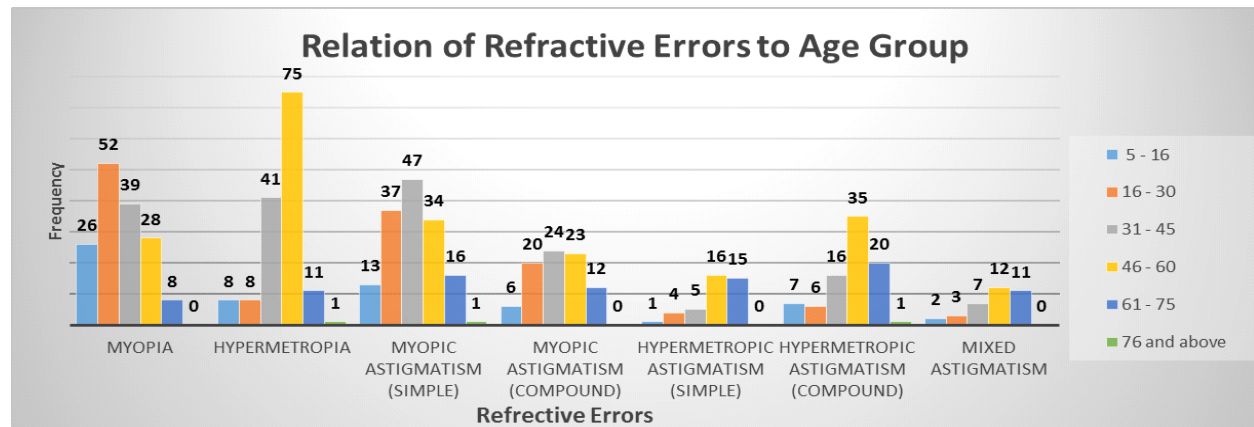
Graph No.2: Relationship of Refractive Errors to Age Group

DISCUSSION

In this study we found the most frequent refractive error to be myopia seen in 153(22.1%) patients followed by simple myopic astigmatism seen in 148(21.4%) patients. this is in accordance with the study conducted by ayoob.m et al in which myopia and myopic astigmatism were found to be the most frequent refractive errors in age group ranging from 16-30 years i.e 39% and 51.1% respectively (p value 0.001)[8]. Another study stated that myopia appears to be more prevalent in pakistani adults (31.4%) than in western population i.e. 26.5% in beaver dam eye study; 17.6%in rotterdam study, 17.97% in the proyerto vision education and research,16.76% in the baltimore study; 15.79% in the melbourne vision impairment project and 12.6% in the blue mountain eye study.[9] A study conducted in rural china on individuals aged 30 years and above showed an overall prevalence of 26.7% of myopia which was followed by hypermetropia (15.9%),astigmatism (24.5%) and anisometropia(7.7%). It concluded that myopia affected more than one quarter of rural Chinese persons aged > 30 years of age. [10]

Refractive error and age: According to John H kempen et al with increasing age, prevalence of hypermetropia was higher and myopia is the most common disorder in the age group (31-60years).This study also indicated that the crude prevalence of myopia is the highest of any disorder in this age group affecting about 1 in 4 persons in the United States and Western Europe and about 1 in 6 of Australians.[11]

In our study we found Myopia to be the most prevalent refractive error in age group ranging from (5-45) years which were 372 patients in number while in ages (46-60) years hypermetropia was seen with a total of 223 patients. A study on Chinese population showed that refractive error varies with age. For Myopia a typical U shaped bimodal pattern was seen. This study also showed that the age pattern as compared to myopia was reversed for hypermetropia with the highest prevalence at the age of 60-69 years.[12]

A study on Refractive errors on Nigerian adults showed the crude prevalence of myopia to be 16.2% which increased steadily with increasing age while hypermetropia with a prevalence of 50.7% was found to have an inverse j-shaped distribution with age[13]

Refractive errors and sex: In our study Myopia was the most common refractive error seen in males which amounted to 86 in number (26.6%) however in females hypermetropia was the most common refractive error seen in 83 females (22.6%).Also the occurrence of simple myopic astigmatism, hypermetric astigmatism (both simple and compound) and mixed astigmatism were found in females more than males and this could be due to increased total number of female patients visiting the OPD department. This is in accordance with a study done Nigerian adults which showed the prevalence of hypermetropia was significantly higher for women versus men(55.6% versus 44.7%). Hypermetropia was seen to rise to maximal levels in the 50-59 age group followed by a decline in later years. The higher prevalence of hypermetropia for women was also observed in other studies conducted in Bangladesh, South Indian population, Australia and United States.[14, 15,16,17,18]. In rural India similar results were obtained with hypermetropia being more common in women than in men. Hypermetropia was shown to increase until the age of 60 years followed by a decline.[19]A study on Chinese Adults also showed a significantly higher prevalence of hypermetropia and astigmatism while there was no significant difference between the two genders in age adjusted values for myopia.[20]

The limitations in our study included a relatively small sample size .Also there was inadequate documentation regarding associated features such as Diabetes, hypertension, heart disease and Myopic family history. The strength of our study was that although the prevalence of refractive errors has been analyzed in other parts of Pakistan there has been no study which has shown the correlation of simple and compound myopia and hypermetropia to age and sex of individuals.

Our Study showed Simple Myopic Astigmatism to be prevalent more in females than males while compound myopic astigmatism was found to be present in greater frequency in males 44(13.6%) versus females 41(11.1%).However hypermetropic astigmatism both simple and compound were seen in to occur more in females(76) as compared to males(50).When comparing the prevalence of simple and compound myopic astigmatism in different age groups we found simple myopic astigmatism to occur in greater frequency in individuals aged 5-45 years.In patients of age group 46-60 years and 61-75 years compound hypermetropic astigmatism was found to dominate over other types of astigmatism.

CONCLUSION

In our study we found myopia to be the most common refractive error (n=153 22.1%) followed by myopic astigmatism (n=148 21.4%). Myopia and myopic astigmatism were seen in males more than females while hypermetropia, hypermetropic astigmatism (both simple and compound) and mixed astigmatism were seen in more in females as compared to males. Myopia was seen as the most common refractive error in individuals aged 5-30 years and myopic astigmatism was present most commonly in individuals aged 31-45 years. Hypermetropia was found in greatest frequency in patient's aged 46-60 years and 61-75 years age group.

In summary we found variation in the prevalence of refractive errors not only amongst genders but also a strong correlation of refractive error to age was also observed.

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