

Original Article

Patterns of Refractive Errors at Independent Medical College, Teaching Hospital, Faisalabad

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ABSTRACT

Objective: To determine the patterns (Frequency and types) of refractive errors, affecting different age groups of our population and to suggest glasses for huge functional improvement of individuals.

Study Design: Descriptive Study

Place and Duration of Study: This conducted at Independent University Hospital Faisalabad in collaboration with Allied Hospital (Punjab Medical College) Faisalabad from 15 March 2010 to 31 March 2011.

Materials and Methods: Patients of all age groups presented in Eye OPD with the complaint of visual acuity having less than 6/12, were underwent history and detailed examination (Including retinoscopy, autorefraction and cycloplegic refraction in children less than 8 years).

Exclusion criteria: Patients with corneal opacity, glaucoma, penetrating trauma, cataract, aphakia, macular or retinal diseases were excluded.

Results: Out of 8215 OPD patients 658 (8%) had refractive error. Mean age was 31 years. Age varied from 5 to 66 years. New patients were 533 (81%), while patients required refinement of refraction, were 125 (19%). Individuals up to the age of 15 years were 119 (18.08%), between 16 to 29 years were 196 (29.79%), 30 to 40 years were 151 (22.95%) and above 40 years were 192 (29.17%). It was found that male were 260 (39.51%) while female 398 (60.49%). Myopia was 381 (57.90%) hypermetropia was 122 (18.54%) while astigmatism was 155 (23.56%). Myopic astigmatism was 114 (17.33%) and hyperopic astigmatism was 41 (6.23%). All individuals showed improvement with glasses.

Conclusion: Refractive error is very common in our population. Female are affected more commonly than males. Myopia is more frequent. Astigmatism also affects almost every fifth patient with refractive error.

Key Words: Refractive error, Myopia, Hypermetropia, Astigmatism.

INTRODUCTION

Vision is a gift of God. Blindness is curse. It is estimated that 2.3 billion people worldwide have refractive errors; out of which 1.8 billion have access to adequate eye examination and affordable corrections leaving behind 500 million people, mostly in developing countries with uncorrected error causing either blindness or impaired vision.¹

The World Health Organization introduced the global initiative for elimination of avoidable blindness by the year 2020 known as "Vision 2020 initiative". Refractive errors are one of the priority areas for vision 2020 initiative as they are common and because corrective spectacles provide a remedy that is cheap, effective and associated with huge functional improvement. Refractive errors which account mostly for low vision and visual handicap are the third largest cause of preventable/curable blindness in Pakistan.²

In Pakistan 11.4% of the blindness is due to uncorrected refractive errors including that is caused by aphakia (natural lens extraction during cataract surgery).³ In one study it was found that the refractive errors account

for 8% cases of unocular blindness in NWFP.⁴ School children are considered to be high risk group because uncorrected refractive errors can seriously affect their learning abilities⁵, their physical and mental development⁶, on the other side young and adults cannot perform well due to uncorrected refractive errors.

The objectives of the study were to determine the types and frequency of refractive errors in different age groups and to suggest the required glasses to improve their functional efficiency.

MATERIALS AND METHODS

This descriptive study was conducted at eye department Independent University Hospital Faisalabad. Six hundred and fifty eight patients out of 8215 OPD cases were included in the study. Over a period of one year from 16th March 2010 to 15th March 2011 was included in the study. Patients having previous ocular surgery with corneal opacity, glaucoma, penetrating trauma, cataract, aphakia, macular or retinal diseases were excluded from this study. Patients of all age groups presented in Eye OPD with the complaint of

visual acuity having less than 6/12, were underwent history and detailed examination (Including retinoscopy, autorefraction and cycloplegic refraction in children less than 8 years with 1% cyclopentolate eye drop three times with 10 minute interval), ocular motility with cover test for near and distance for children, papillary reaction, direct ophthalmoscopy and examination of anterior segment with slitlamp and detailed fundus examination as required. Visual acuity was measured with Snellen's chart, E-chart or Lea charts. For every patient visual acuity was tested without correction, pinhole and with correction. Objective refraction was determined using a Topcon autorefractometer. Appropriate spectacles wearing guidance was provided to all patients and refinement of refraction (and glasses) six monthly or annually according to age, advised to all individuals. The data was processed by the computer special package for social sciences (SPSS).

RESULTS

Out of 8215 OPD patients 658 (8%) had refractive error. Mean age was 31 years. Age varied from 5 to 66 years. Individuals up to the age of 15 years were 119 (18.08%), between 16 to 29 years were 196 (29.79%), 30 to 40 years were 151 (22.95%) and above 40 years

were 192 (29.17%). It was found that male were 260 (39.51%) while female 398 (60.49%). Myopia was 381(57.90%) hypermetropia was 122 (18.54%) while astigmatism was 155 (23.56%). Myopic astigmatism was 114 (17.33%) and hyperopic astigmatism was 41 (6.23%). All individuals showed improvement with glasses. Patients were divided into four major groups according to age. In age group 1 (5 to 15 years) and Group 2 (16 to 29 years) myopia is significantly higher than other refractive errors. As the age advances, prevalence of myopia decreases while that of hypermetropia increases also shown in table 2 (Tables No. 1-2)

Table No. 1: Distribution of patients according to age (n=658)

Age Group	No. of Patients	Percentage
Group 1 (5 -10 years)	119	18.08
Group 2 (16 to 29 years)	196	29.79
Group 3 (30 to 40 years)	151	22.95
Group 4 (>40 years)	192	29.17

Table No. 2: Gender and refractive error pattern distribution of age in all groups

Group	Total (%)	Males (%)	Females (%)	Myopic (%)	Hypermetropia (%)	Astigmatism (%)
1	119 (100%)	44 (36.9%)	75 (63.1%)	79 (66.4%)	12 (10.1%)	28 (23.5%)
2	196 (100%)	76 (38.7%)	120 (61.3%)	143 (72.9%)	18 (9.2%)	35 (17.9%)
3	151 (100%)	72 (47.7%)	79 (52.3%)	76 (50.4%)	27 (17.8%)	48 (31.8%)
4	192 (100%)	68 (35.4%)	124 (64.6%)	83 (43.3%)	65 (33.8%)	44 (22.9%)

DISCUSSION

This study was designed to determine the types and frequency of different refractive errors among different age groups (5 to 66 years) in our population presented in our hospital. A population based survey should have been conducted but due to limited resources and different other reasons it was not possible. However, the individuals presented with refractive errors were divided into four age groups for the purposes of comparison of the patterns of refractive error to other studies. Refractive errors are among the leading causes of visual impairment worldwide and are responsible for high rates of low vision and blindness in certain areas⁷. In younger age group (up to 15 years), the refractive error study in children in China⁸, Chile⁹ and Nepal¹⁰ is the first multicountry population based assessment of

refractive errors in children. The data reveals that there are significant and large geographic differences in the prevalence of refractive errors and that uncorrected refractive errors are very common. The prevalence of refractive error of 18% in our study is higher than the percentage of refractive error in China⁸ 11.3%, in Chile⁹ 9.8%, in Southern Ethiopia¹¹ 11.8%, in Tanzania¹² 6.1%, in Turkey¹³ 11% and Baltimore¹⁴ 8.2%.

In our study the prevalence of myopia was 66.4%, hypermetropia 10.1% and astigmatism 23.5%. The study done among school children in Dezful, Iran revealed overall rate of myopia in students 15 years of age and younger as 3.4%, hyperopia 16.6% and astigmatism 18.7%¹⁵. The study done by Mingguing et al showed prevalence of myopia was 3.3% in 5 years old. Hyperopia measured with retinoscopy was present

in 16.7% of 5 years old. Astigmatism was present in 33.6% of children¹⁶. According to Tehran eye study the age and gender-standardized prevalence of myopia based on manifest refraction was 21.8% (95% confidence interval (CI), 20.1 to 23.5) and that for hyperopia was 26.0% (95% CI, 24.5 to 27.6). Prevalence of myopia and hyperopia differed significantly among the age and gender groups ($P < 0.001$). Astigmatism of 0.75 dioptre cylinder or greater was present in 29.6% (95% CI, 28.5 to 31.1) of right eyes with manifest refraction and in 30.3% (95% CI, 28.5 to 32.1) with cycloplegic refraction. Among the study population, 6.1% (95% CI, 5.3 to 6.8%) had anisometropia of 1 dioptre or more¹⁷.

In our study it was found that 44 (37%) patients were male while 75 (63%) were female. This is not different to multicountry survey of refractive error in children in China⁸, Chile⁹ and Nepal¹⁰ where both myopia and hyperopia were significantly higher in females than males. In a study conducted in China⁸ it was found that the myopia of -0.5D or less in either eye was essentially absent in 5 years old children, but increased to 36.7% in male and 55% in females by age of 15. Over the same age range, hypermetropia of 2 dioptres or greater was from 8.8% in males and 19.6% in females to less than 2% in both sexes. Similar results were found in refractive error study in children from La Florida Chile⁹.

In the study done at Mayo Hospital Lahore showed errors of refraction were the third common disorders, affecting 494 children, of which the majority, (63%) were above the age of five, 30% in the one to five age group and only 7% were under the age of one. In the gender distribution major bulk of the cases was males. The cases in this category comprised of hypermetropia (82%), Myopia (13%) and astigmatism (5%). The majorities of the children, (54%) were males between the ages of five and fifteen and were affected by hypermetropia¹⁸. In a study done at Department of Ophthalmology, Jinnah Postgraduate Medical Centre Karachi, Pakistan showed that refractive error of 2% was found to be the cause of primary ocular morbidity in children 5-15 years of age.¹⁹ Refractive errors are significant cause of visual disability in school children. While primary vision screening by teachers tremendously decreases the workload of ophthalmic staff. Teachers can effectively identify those children with poor vision for refraction and corrective spectacles.

In our study, age group 2 (16 to 29 years) has the similar pattern of refractive errors to first younger age group (5 to 15 years). Myopia, hypermetropia and astigmatism was 72.91%, 9.18 % 17.86 % respectively. Only myopia worsens with the advancement of age which probably shows the increased visual activity like intensive study and near work in this age group.

Myopia is strongly associated with literacy and young had the highest rate of literacy (if used as proxy for near work) our finding provide some support towards the "use/abuse" theory of myopia.²⁰ The high prevalence of myopia in the age group (30 to 39 years) provides some support for a cohort effect in the young.²¹

In age group 3 (30 to 40 years) myopia gradually decreases (50.33%) in severity and it still continue to decrease (43.23%) in above 40 years, while hypermetropia increases with advancement of age (Table 2). In our study, adult age group 3 (30 to 40 years) myopia, hypermetropia and astigmatism were 50.33%, 17.88% and 31.79% respectively, while in adult age group 4 (above 40 years) these errors were 43.23%, 33.85% and 22.92% respectively which are similar to the results of a study conducted in the adult Pakistani population, the crude prevalence of myopia, hypermetropia and astigmatism was 36.5%, 27.1%, and 37%, respectively.²²

The prevalence of myopia in this study was significantly higher than in a national survey in Bangladesh²³ but similar to that reported from Southern India (≥ 40 years, 36.5%)²⁴ but lower than among Singaporean Chinese (38.7%).²⁵

Refractive error has variable pattern in different age, sex, geography and races. Refractive blindness is a major cause of morbidity in our population. It shows inadequacy of eye care services in general, perhaps treatment of refractive error is simple and effective that is in the form of glasses. Vision screening programme should be started at national level to detect individuals suffering from refractive blindness. In this context an adequate infrastructure should be developed at the level of rural health centre with trained personnel to perform reasonable quality of refraction. An affordable, reasonable-quality spectacle should be provided to the individuals with refractive blindness. All the individuals with refractive error should be advised to undergo refinement of refraction once or twice annually to improve the functional efficiency of life.

CONCLUSION

Refractive error is very common in our population which contributes to the third major cause of preventable blindness in Pakistan. It affects all age groups, in children it interferes with the learning abilities; in young and adults, it impairs the learning skills and functional efficiency. Females are affected more commonly than males 6:4. Myopia is more frequent (57.90% $n=381$). Astigmatism also affects almost every fifth patient with refractive error (23.56% $n=155$). It should be diagnosed and treated at an early stage especially in children so that a clear vision can be restored to achieve maximum learning abilities. Glasses remain the mainstay of treatment which is highly cost

effective. All the individuals with blurred vision should be educated to undergo refraction and refinement six monthly or annually according to age group.

Suggestions

- A comprehensive eye care programme should be started at national level so that individual with refractive errors should be corrected with glasses at appropriate age.
- It should be diagnosed and treated at an early stage especially in children so that a clear vision can be restored to achieve maximum abilities. Glasses remain the mainstay of treatment which is highly cost effective. All the individuals with blurred vision should be educated to undergo refraction and refinement annually.

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