ORIGINAL ARTICLE

Refractive Errors in Patients Attending DHQ Hospital Sargodha: A Cross-Sectional Study

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ABSTRACT

Objective: To determine the frequency of different refractive disorders in patients visiting DHQ hospital Sargodha.

Study Design: Cross sectional study.

Place and Duration of Study: Study was conducted at Department of Ophthalmology, DHQ. hospital Sargodha from 3rd February 2017 to 7th April 2017.

Materials and Methods: A total of 5764 patients attending ophthalmology department of DHQ hospital Sargodha were screened for refractive disorders by measuring visual acuity and carrying out pin-hole test. After this auto refraction (using Topcon Refractometer) and subjective refraction examination (trial and error method) were carried out. Retinoscopy was done in children, following which cycloplegic refraction was performed. The results of examination were recorded from hospital records and data analyzed using SPSS version 19. *P* value of <0.05 was taken as significant for chi square test.

Results: Among refractive disorders, hypermetropia (28.29%) was most prevalent followed by astigmatism (28.32%), myopia (21.76%) and presbyopia (21.63%). Females suffered more from refractive disorders (58.21%) as compared to men (41.79%). On the basis of age group, myopia was the most common disorder amongst children (2.44%), adolescent (4.67%) and early adulthood (9.81%) while presbyopia was most common in middle adulthood (17.23%) and late adulthood (2.38%).

Conclusion: Hypermetropia, astigmatism, myopia and presbyopia are common refractive disorders in population of Sargodha District of Punjab, Pakistan. Refractive disorders are more common among females. With the exception of myopia, these tend to occur more in older age groups.

Key Words: *Astigmatism, Hypermetropia, Myopia, Presbyopia, Refractive Disorders.*

Introduction

Refractive errors result because of inability of eye to focus light onto the retinal plane. This leads to the blurring of vision. Refractive errors are categorized into (i) Myopia (ii) Hypermetropia (iii) Presbyopia (iv) Astigmatism. Myopia results when light entering eye is focused in front of retina either on account of increased refractive power of eye or because of increased axial length of eyeball. Hypermetropia occurs when light is focused behind retina. Again this can be because of decreased refractive power of eye or its reduced axial length. Presbyopia is an insufficiency of accommodation while astigmatism results when parallel rays of light entering eye fail to form a single focal point on retina.[1]

WHO launched its first report on vision in 2019 in an effort to address the challenges posed by uncorrected refractive errors. A whopping 2.6 billion people are estimated to be myopic and 1.8 billion suffering from presbyopia. It is also estimated that 1 billion people suffer from vision impairment that could have been prevented or is yet to be addressed. 123.7 million, of these 1 billion people suffer from unaddressed refractive errors.[2] The costs of the coverage gap for uncorrected refractive disorders and cataract globally are estimated to be $14.3 billion US dollar.[2] Lack of basic healthcare infrastructure further compounds problems faced by low income countries like Pakistan. While WHO report on vision and other global studies provide a

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rough estimate, these fail to highlight challenges faced at a local level and there is a need to supplement these with local level studies so as to get a better picture of the task at hand[3,4,5]. Mapping of disease at district level will allow efficient distribution of limited health care resources. There is no record of a prior study on refractive disorders in Sargodha district. Addressing this scarcity of local level data and to highlight gender/age based variations in refractive disorders were the main aims of this study. Sargodha district, Punjab (Pakistan) was selected for this purpose. Sargodha district has an estimated population of 2.67 million as per 1998 census[6] DHQ hospital Sargodha provides health care services to a large chunk of this population which made it an ideal place for conducting a study with the objective of determining the frequency of different refractive disorders in patients visiting the hospital.

Materials and Methods

This was a cross-sectional study conducted at department of ophthalmology, DHQ Sargodha from 3rd Feb 2017 to 7th April 2017. A total of 5,764 patients with refractive disorders visited the ophthalmology department during this period. The diagnosis of any of the refractive disorders was the inclusion criteria while Emmetropic individuals and those with squint were not included in the study. Permission was granted by the ethical review board of DHQ hospital Sargodha after reviewing the pilot study. On the basis of age, patients were classified as (I) Children (0-12yr) (II) Adolescence (13-19yr) (III) Early Adulthood (20-40yr) (IV) Middle Adulthood (41-65yr) (V) Late Adulthood (more than 65yr). Patients were informed about the nature of study and its significance. In a brief interview in with the patient their name, age, sex and address were inquired. Initially, visual acuity was determined and pin-hole test carried out by the medical officer in charge of refraction room. This was followed by auto refraction using Topcon Refractometer and subjective refraction examination (Trial and error method) by consultant ophthalmologist. Retinoscopy was carried out in Children (0-12yr), following which they underwent cycloplegic refraction. Myopia was defined as spherical equivalent values of less than -0.5 D, hypermetropia as greater than +0.5 D and emmetropia as spherical equivalent between -0.5 and +0.5 D. Cut off value of greater or equal to 0.25 D in minus cylinder was used for astigmatism. The results of examination were recorded from hospital records and data analyzed using SPSS version 19. While performing Chi-square test *P*-value of <0.05 was taken as significant. Literature related to the study was sought using PubMed Health, Medline and manual google searches.

Results

A total of 5,764 patients were included in the study. The mean age and standard deviation of study subjects was 37.43 and 18.40 respectively. The overall age-range of study participant was 3-105 yr. A majority of patients presented with combination of refractive disorders rather than a single disorder. Table I shows distribution of different refractive disorders on the basis age and sex. Table II shows the distribution on the basis of gender (without taking age into consideration), while table III indicates distribution in different age groups (without taking gender into consideration).

Table I: Relative Proportion of Myopia, Hypermetropia, Astigmatism and Presbyopia in Different Age Groups

	MALE			
	Myopia	Hypermetropia	Presbyopia	Astigmatism
Children	1.18%	0.79%	0%	0.69%
Adolescence	2.11%	0.70%	0.04%	1.16%
Early Adulthood	4.90%	2.88%	0.64%	3.73%
Middle Adulthood	1.55%	5.45%	6.03%	5.69%
Late Adulthood	0.38%	1.10%	1.42%	1.35%

	FEMALE			
	Myopia	Hypermetropia	Presbyopia	Astigmatism
Children	1.26%	0.91%	0.01%	0.75%
Adolescence	2.56%	0.25%	0.02%	1.23%
Early Adulthood	4.91%	4.95%	1.31%	3.78%
Middle Adulthood	2.62%	10.48%	11.20%	8.98%
Late Adulthood	0.29%	0.78%	0.96%	0.96%

Table II: Gender Differences in Refractive Disorders

MALE			
Myopia	Hypermetropia	Presbyopia	Astigmatism
10.12%	10.92%	8.13%	12.62%

FEMALE			
Myopia	Hypermetropia	Presbyopia	Astigmatism
11.64%	17.37%	13.5%	15.7%

Females suffered more from all of the refractive disorders (58.21%) as compared to men (41.79%) and the difference was found to be significant. The difference between genders in hypermetropia was

most significant (p<0.05) followed by presbyopia, astigmatism and then myopia.

Table III shows distribution of different refractory errors in different age groups. Myopia was most prevalent in 'Early Adulthood'. Hypermetropia was relatively more prevalent in older age groups. A similar trend was seen with astigmatism. Presbyopia was found to be virtually nonexistent in early age with majority of cases being in 'Middle Adulthood' and 'Late Adulthood' categories.

Table III: Age Differences in Refractive Disorders

	Myopia	Hypermetropia	Presbyopia	Astigmatism
Children	2.44%	1.70%	0.01%	1.44%
Adolescence	4.67%	0.95%	0.06%	2.39%
Early Adulthood	9.81%	7.83%	1.95%	7.51%
Middle Adulthood	4.17%	15.93%	17.23%	14.67%
Late Adulthood	0.67%	1.88%	2.38%	2.31%

Discussion

The overall occurrence of refractive disorders was as following (I) Hypermetropia (28.29%) (II) Myopia (21.76%) (iii) Presbyopia (21.63%) (IV) Astigmatism (28.32%). Females suffered from all refractive disorders and this difference was statistically significant. Myopia was most prevalent in early adulthood while the rest of refractive disorders occurred more in older age groups. Earlier studies conducted in Pakistan show mixed results in terms of magnitude of different refractive disorders. A study conducted in rural population of Pakistan showed Hypermetropia to be most common, followed by myopia and astigmatism.[7] The study shows prominent difference between myopia and Hypermetropia in terms of magnitude. However this trend is not seen in case of our which can be explained by the fact that Sargodha district is not yet fully developed and lies somewhere in a grey area between rural and urban classification. Other studies, such as on 3-22 yr old patients in rural areas of Paraguay and on pediatric patients in rural India[8, 9] indicate myopia as the most common refractive disorder which is consistent with our findings. A relationship between type of refractive disorder and the nature of area (Rural or Urban) might be there and requires further investigation. Hypermaetropia was found to be most common refractive disorder in older age groups; this was reported by a number of studies. For instance, a study on European population showed similar results.[10] Work by Phillipa, Yanchun, et al in UK indicated hypermetropia as the most common refractive disorder in 40+ year old adults[11]. Similar findings were reported by a study conducted in Mexico and Pakistan.[7, 12] Myopia on the contrary was the most common refractive disorder amongst younger age groups; a finding supported by multiple studies.[11,13] While we found females to be suffering more from all refractive disorders, a detailed work on Indian pediatric patients by Ojha Sushil, et al shows similar findings for myopia {Girls (59.38%), Boys (40.62%)}, hypermetropia {Girls (84.21%), Boys (15.79%)} and astigmatism {Girls (69.52%), Boys (35.48%)}.[9] On the contrary a study done in Europe found astigmatism more common in men and hypermetropia in women. No statistically significant difference was noted in case of myopia.[10] Similarly a UK based study found hypermetropia to be more common in females but didn't report any similar differences with other refractive disorders [11]. Female children were found to be suffering more from combined refractive errors as compared to male { OR: 1.2 and OR: 1.1 respectively} in India[14] It is worth noting that prevalence of refractive disorders amongst males and females shows a great deal of variation depending upon the geographical area in question. For instance, myopia was more common in girls, hypermetropia in boys and no association of astigmatism was reported with gender in Saudi Arabia [15], while in South Africa [16] myopia and astigmatism were more common in males whereas women suffered more from hypermetropia. This gender based variation in case of myopia might be due to hormonal factors as pointed out by a global study into the trends of myopia and high myopia.[3] The purpose of our study was not only to point out the trends in refractive disorders in different age groups but also to assess the burden of these disorders on the health care system of district Sargodha. It can be argued that the data collected from DHQ hospital Sargodha is not an accurate representation of actual situation. The reliance on one source for data collection is a major limitation of this study and there is a need to carry out multiple studies at THQ (tehsil headquarter) hospital level so as to carry out satisfactory mapping of refractive disorders. Another limitation of the study was the failure to explain gender differences. Future studies

should address this and explore any association between sex hormones and refractive disorders.

Conclusion

Hypermetropia, astigmatism, myopia and presbyopia are common refractive disorders in population of Sargodha District of Punjab, Pakistan. Refractive disorders are more common among females. With the exception of myopia, these tend to occur more in older age groups.

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