Keratometric Values and Astigmatic Distribution in Population of South Lahore

Astigmatic in Population

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ABSTRACT

Objective: To assess distribution of astigmatism among individuals of South Lahore

Study Design: Cross-sectional study.

Place and Duration of Study: This study was conducted at the Central Park Medical Teaching Hospital Lahore from 1st January 2018 to 31st March 2018.

Materials and Methods: In the present study, keratometric findings of 229 patients (458 eyes) were analyzed, who were presented with refractive problems to know their refractive status. The patients belonged to different localities of South Lahore.

Results: No statistical significance was present for age; however, female gender was statistically associated with higher K readings.

Conclusion: It is concluded that there is a high prevalence of astigmatism among population of southern Lahore. Keratometric values are found higher in female population. These values should consider in planning refractive surgery.

Key Words: Kerotometry, Astigmatism, Refractive surgery

INTRODUCTION

Astigmatism is a refractive error and an inability of cornea and lens to appropriately focus an image on the retina. It can vary from being congenital, surgically induced, contact lens induced, compounded with near sightedness or far sightedness.[1] Depending on the axis of principal meridians, it may be irregular or regular. The advanced technology has aided in precise diagnosis of astigmatism along with its proper correction. The most common method used to diagnose and measure astigmatism is keratometry.[2] Keratometry is a diagnostic approach used to measure anterior central corneal curvature. It is performed with a manual keratometer. This device gives an idea about the refracting power of cornea with two corneal curvature values.[3]

The problem of astigmatism is increasing day by day. As children have immature and developing visual system, astigmatism is highly prevalent in them. It is considered to be influenced by age. In newborns, astigmatism has been reported to be as high as 70%.[4] Another study reports that in older children

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it may decrease to 12-13 % till the age of 10 years.[5] In another study, children with age 10 were reported to have 25 % prevalence of astigmatism.[6] Though less prevalent than children, elder individuals also suffer from the issue of astigmatism.[7] Keratometric values define the corneal power. Higher mean Ks may indicate the presence of higher number of Keratoconus suspects.[8]

Astigmatism is responsible for causing optical defocusing at all distances. In order to get a sharp focus, high strain is laid on ciliary muscles of the patient. This can cause asthenopia and eye-strain. Moreover, it has been reported to cause amblyopia and myopia in the patients.[9] Thus, it is highly important to assess the distribution of astigmatism in general population to devise better strategies that can be helpful in dealing against the problem.[10] The present study aims to assess the distribution of astigmatism and k values among individuals of South Lahore.

MATERIALS AND METHODS

This cross-sectional study was carried out at Central Park Medical Teaching Hospital Lahore from 1st January, 2018 to 31st March 2018. In the present study, retinoscopic findings of 229 patients was analyzed, who were presented with refractive problems to know their refractive status. All the patients were examined at Central Park Teaching Hospital from January, 2018 to March, 2018. The patients belonged to different localities of South Lahore. The patients were selected randomly on the basis of availability and

willingness to become a part of the study. All the patients were explained about purpose of the study and consent forms were collected from each patient. Refraction was conducted on each patient objectively with the help of Helmholtz Keratometer. It is a one-time positioning device that uses adjustable image size. It is assisted with an aligning plus sign and minus sign mires. Sphero-cylindrical method of refraction was utilized to minimize movements. In order to make complete adnexal and biomicroscopic anterior segment examination, Topcon slit-lamp was used. Fundus examination was done with 90D. The children having age of 10-20years, cyclogenic refraction was performed after 40-50 minutes with topical instillation of 1% cyclopentolate eyes drops, with interval of 5 to 10 minutes. The data was analyzed with the help of SPSS v.17. The descriptive data is represented as frequencies, percentages and mean±SD. The Chi square test and ANOVA test was used to assess relation of K values with ages and genders.

RESULTS

According to age, out of 229 cases (458 eyes), 30.57% (n=70) were between 10-20 years, 37.55% (n=86) were between 21-40 years, 21.84% (n=50) were between 41-60 years and 10.04% (n=23) had >60 years with mean being 34.00±18.02 years (Table 1). Gender distribution shows that 44.54% (n=102) were male and 55.46% (n=127) were females (Table 2). Overall mean K values of the participants were calculated as 43.93±5.44 for K1R, 44.10±1.57 for K2R, 44.18±1.64 for K1L, and 44.16±1.65 for K2L (Table 3). It was observed that there was no significant difference for any of the K-value among 4 age groups as all p-values recorded were close to 1.000 (above 0.75) after applying ANOVA test of significance (Table 4). The difference for all K-values were found significant between two genders with p-values 0.001 or less except K1R with 0.0013 and K2R with 0.0014 (Table 5). Mean astigmatic value was 0.2112 D, SD 0.1922. Central astigmatic value is 0.25 D. No significant difference is found among gender and age groups $p > 0.05$ (Table 6).

Table No.1: Age distribution

Age years)	No.	%
10-20	70	30.57
21-40	86	37.55
41-60	50	21.84
>60	23	10.04
Mean±SD	34.00±18.02	

Table No.2: Gender distribution

Gender	No.	%
Male	102	44.54
Female	127	55.46

Table No. 3: Overall mean K values of the patients

K values	Mean±SD
K1R	43.93±5.44
K2R	44.10±1.57
K1L	44.18±1.64
K2L	44.16±1.65

Table No.4: Stratification of K values according to age group

K values	Age (years)				P value
	10-20	21-40	41-60	>60	
K1R	43.93±5.44	44.21±1.58	44.33±6.40	44.22±1.73	0.963
K2R	45.07±5.47	45.25±0.02	45.25±6.34	45.25±0.01	0.99
K1L	43.92±5.47	44.19±1.57	44.44±6.47	44.36±1.96	0.929
K2L	43.89±5.46	44.19±1.64	44.40±6.46	44.37±1.84	0.927
KR	44.5±5.45	44.73±0.8	44.79±6.37	44.42±6.47	0.979
KL	43.91±5.45	44.19±1.61	44.79±6.47	44.37±1.9	0.75

Table 5: Stratification of K values according to gender

K value	Gender		P value
	Male	Female	
K1R	43.78±1.58	44.44±1.47	0.0013
K2R	43.73±1.61	44.39±1.47	0.0014
K1L	43.73±1.70	44.53±1.55	0.0002
K2L	43.71±1.65	44.52±1.58	0.0002
KR	43.75±1.59	44.42±1.47	0.0001
KL	43.72±1.65	44.53±1.59	0.0001

Table No.6: Comparison of TAR and TAL Keratometric Astigmatic values according to gender

Measure	Gender	N	Mean	Std. Dev.	Std. Error	Min.	Max.	ANOVA F & P value
TAR	Male	101	.2426	.19511	.01941	.00	.75	F = .221 P = .639
	Female	128	.2305	.19240	.01701	.00	.75	
	Total	229	.2358	.19327	.01277	.00	.75	
TAL	Male	101	.1906	.20046	.01995	.00	1.00	F = .075 P = .784
	Female	128	.1836	.18423	.01628	.00	1.00	
	Total	229	.1867	.19116	.01263	.00	1.00	

DISCUSSION

Refractive errors are known as the most common ocular problem, which affect all the age groups and genders. It is regarded as a public health challenge. According to WHO, 43% of visual impairments are caused by refractive errors. This has resulted in high prevalence of visual loss all over the world.2 In year 2010, it was estimated that 101.2 million people have become visually impaired due to uncorrected refractive errors, whereas, 6.8 million individuals have become blind due to the same. Consequently, the economies of different nations are also affected by refractive errors. An annual loss of $ 269 billion has been reported to result from refractive errors, worldwide.[11] In people with age more than 50 years, this figure has been reported to be $ 121.4 billion. Resultantly, WHO has placed refractive errors among five highly prioritized conditions. Astigmatism is given important due to its high distribution, its influence of visual development in childhood and problem in correcting it has resulted in spectacle intolerance.[12]

Astigmation results in optical defocus at all viewing distances. The ciliary muscles bear constant strain to obtain a sharp focus, which leads towards eye-strain and asthenopia in astigmatic individuals. Astigmatism has impact on all the ages, and genders. However, in children the effect is more pronounced due to immature and developing visual system. It is reported to be associated with myopia and amblyopia. Its detection in early years of life is important as it has high impact on normal visual development. The alternations in cornea shape can take place at once or over several years. However, after age of 15, astigmatism may not increase considerably.[13]

Shah et al[4] estimated prevalence of different refractive errors among adults of Pakistan. According to this study, astigmatism in Pakistan is estimated to be 37%. This represents an adverse condition among residents of Pakistan. In the present study, data from South Lahore was collected, astigmatic prevalence was noted to be 64.52%. This is quite high as compared to previously reported ones. Abdullah et al1 claimed that adults with age 30 have prevalence of 5.6% in rural population of Pakistan. This indicates a tremendous increase in prevalence of astigmatism among individuals of this age category. However, Hashemi et al[10] pointed that overall prevalence of astigmatism for adults is 40.4 %. In Indonesia, prevalence for astigmatism has been noted to be 56.90 % among adults.[14] Chinese population was found to have 56.35 % prevalence of astigmatism for age of 40 above years.[15]

The prevalence of astigmatism was found to be 66% among children of age 10-20 years. Previous studies in Pakistan have indicated that refractive errors have prevalence of 20.07% in school children of Pakistan. This figure is quite lower than the findings of present study. In USA, prevalence of astigmatism has been noted to be 42% for children. In Iran, it was noted to be 50.2% among children with age of 5 years. On gender basis, females were found to have prevalence of 55.46% as compared to males with prevalence of 44.54%. This is in accordance with the work of Rasheed et al.[11]

There is significant difference between mean Ks 43.57±1.57 male and 44.42±1.47 female. The higher distribution among female may show the higher prevalence of Keratoconus suspect among population. This result is consistent with the work of KhabazKhoob et al.[8] The findings of present study have indicated that there is no statistically significant difference in astigmatism distribution among the age groups. However, higher K-means is highly associated with gender, with high statistical difference. This is in accordance with the work of Lopes et al[16] and KhabazKhoob.[8]

Many immediate and long term outcomes have been related with uncorrected refractive errors in adults and children. This includes decrease in employment and educational opportunities, lost vision, poor quality of life and economic disturbances. It is important to screen the individuals with refractive errors such as astigmatism and correct it. Higher K values should consider in keratoconus classification, in refractive surgery indices and evaluation, to avoid treatment, to Keratoconus suspect and post op ecstasies.

CONCLUSION

There is a no significant difference of astigmatism distribution in different age groups. Keratometric higher values in female population should consider in defining the KC among the southern population of Lahore. These should be considered in keratorefractive indices and evaluation, to avoid treatment of keratoconus suspect and post operative ectasia

Author's Contribution:

Concept & Design of Study:	Shahid Nazir
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