Original Article

Frequency Of Aniso-Astigmatsm : A Single Center Experience

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Abstract

Objective: To evaluate Frequency of Astigmatic Anisometropia among all types of refractive error with retinoscopic findings, in patients presented in Eye OPD of Holy Family Hospital.
Study design: It is a Descriptive Cross-Sectional study design.
Place and duration of study: The study was conducted in in Eye OPD of Holy Family Hospital from August 15, 2018 to January 15, 2019.
Material and Methods: 60 patients were studied for research purpose. Ophthalmic examination included history taking, slit lamp biomicroscopy, vision and refraction and fundoscopy. Pupillary reflex and orthoptic assessment were performed for the investigation of strabismus. Refractive error in adults was evaluated subjectively whereas in children cycloplegic drugs (e.g. cyclopentolate 1%) were instilled three times in both eyes of the subject with 10 minute interval to produce cycloplegia (paralysis of accommodation) and further assessment was done using an autorefractometer and retinoscope. SPSS version 22 was used to enter and analyze data.
Results: 13 (21%) out of the 60 patients were presented with aniso-astigmatism of < 1D, 25 (41%) with 1D and 22(46%) with aniso-astigmatism >1D. Greater frequency was found in males (51%) than females (49%).With the rule astigmatism was more commonly observed in preteenagers between the age 9-13 years (19; 38%). The prevalence of myopic astigmatism was higher (29; 48%) compared to hyperopic (17; 28%) and mixed astigmatism (14; 23%). 1D was found to be the most prevalent and noticeable level of astigmatism in the sample.
Conclusion: Different genders and age subgroups have different levels of aniso-astigmatism. Findings from this investigation also show that amblyopia may result from aniso-astigmatism refractive faults.
Keywords: Astigmatism, anisometropia, refractive errors,retinoscopy, visual acuity

1. Introduction

Anisometropia, a condition characterized by an interocular difference in an individual's refractive status, is frequently linked to significant visual problems such as reduced stereopsis (depth perception), strabismus (misalignment of the eyes), aniseikonia (difference in retinal image sizes between two eyes), and spectacle intolerance.[1] A genetic tendency that causes uneven eye growth may be the cause of anisometropia. Genetic influence appears to be the cause of a high degree of persistent anisometropia in children of >5D.[2] Astigmatism makes for 13% of all refractive defects in human eyes.[3] It is linked to symptoms such as asthenopia, impaired vision at different distances, and spatial shape distortion, all of which lower the quality of images.[4,5] Sturm's conoid, a bundle of rays formed by an astigmatic optical system consisting of a primary focal line known as the circle of least confusion or diffusion and a secondary focal line known as the sturm's line perpendicular to the first, is formed as a result of various factors such as headaches, photophobia, fatigue, and monocular diplopia.[6] Absolute interocular variation in refractive astigmatism is known as anisometropic astigmatism.

Corneal astigmatism can be caused by a combination of factors such as the rigidity of the ocular surface, pressure from the eyelids on the cornea, or tightness of the eyelids.[7]

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Pattern of inheritance is autosomal dominant.[8] Other ocular causes include hemangiomas and chalazion.[9,10] But it can also be linked to conditions like Treacher Collins Syndrome and Down Syndrome.[11,12] Visual acuity, refraction, retinoscopy, keratometry, ultrasonic pachymetry, and video keratography are among the tests used to evaluate astigmatism.

The course of treatment includes the use of several types of lenses and surgical intervention. Non-surgical treatment options encompass a range of spectacle lenses such as toric lenses, spherocylindrical lenses (a combination of cylinder and sphere), and cylindrical (which can be convex or concave of any dioptric power) lenses.[13] When fitted correctly, contact lenses provide good centration, a flexible wear schedule, increased comfort for certain patients, and the control of related conditions.[14]

Three main types of laser eye surgery are used in surgical treatment: photorefractive keratectomy (PRK), laser epithelial keratomileusis (LASEK), which is best suited for patients with thin corneas, and laser-assisted in situ keratomileusis (LASIK), which accounts for 95% of laser eye treatments and has a short recovery period. LASIK is particularly effective for correcting moderate to high amounts of astigmatism.

A 2013 investigation on the frequency, amount, and axis of astigmatism was carried out by Abbasi S et al. Both genders of patients between the ages of 5 and 70 who had no prior history of eye pathology, surgery, or abnormalities were included. For the measurements, an auto refractor-keratometer was employed. The subgroup of patients aged 26-35 years had a higher frequency of with-the-rule astigmatism (n = 21; 55%) out of the 288 total patients. 88 (48%), against the rule in 81 (44%), and oblique astigmatism in 14 (7.6%), with regard to gender. Astigmatism that was with the rule (50%), against the rule (34.2%), and oblique (16%) was observed in 52 females. Across all age categories, the frequency of astigmatism > or = 0.25 varied from 0.8% (n = 1) to 74% (n = 28). The most prevalent and noticeable level of astigmatism in the sample was found to be less than 1D. Within the gender and age subgroups, there were differences in the amount and axis of astigmatism.[15]

In a population undergoing refractive surgery, SJ Linke et al. (2011) investigated the prevalence of anisometropia and its relationships with spherical ametropia, astigmatism, age, and sex. Cylindrical power was subsequently analyzed using power vector analysis. Subjective refraction prevalence was 18.5%, while cycloplegic prevalence was 19.3%. Age and spherical refractive error were the only factors that were independently linked to anisometropia in hyperopes. Refraction was not greatly impacted by sex or cylindrical power. Every variable in myopes had an independent association with anisometropia. Anisometropia was most significantly correlated with cylindrical power. In myopes, anisometropia was seen more commonly in females than in males and had an independent correlation with cylindrical power.[16]

In 2008, Velma Dobson and her colleagues carried out research on anisometropia in school-aged individuals, defining it as both sphere and cylinder. Of the children, 462 (44.4%) had astigmatism of 1.00 diopter (D) in one or both of their eyes. Seventy children (6.7%) had anisometropia 1.00D spherical equivalent (SE), and fifteen hundred and sixty-six children (15.0%) had anisometropia 1.00 D cylinder. Significant anisometropia was present in 18.1% of cases when there was a discrepancy between the eyes' 1.00 D SE or greater. The prevalence of SE anisometropia is comparable to that of other groups of school age. Astigmatic anisometropia is more common than other school-aged populations, despite this.[17]

SC A study on the distribution of anisometropia and aniso-astigmatism in young Australian children, along with the relationships between ocular biometry and clinical findings, was carried out by Huynh et al in 2006. The prevalence of iso-astigmatism (d1D) was 1.0% (CI: 0.6% to 1.6%). Compared to children who were slightly hyperopic (SE 0.5–1.9D), those who were moderately hyperopic (SE d2.0D) had considerably higher prevalence of both disorders. The prevalence of anisometropia was higher in myopic children (SE

⩽−0.5D). Age, sex, or race had no bearing on either condition. Anisotropia and amblyopia were highly correlated in multivariate analysis. The study found a substantial correlation between aniso-astigmatism and amblyopia, maternal age over 35 (OR 4.0, CI: 1.3 to 11.9), and NICU hospitalization. Relatively substantial interocular variations in anterior chamber depth ($p = 0.0009$) and axial length ($p<0.0001$) caused anisometropia. Variations in corneal astigmatism led to aniso-astigmatism ($p<0.0001$). In this primarily six-year, anisometropia and aniso-astigmatism were infrequent, had significant birth and biometry connections, and were substantially correlated with strabismus and amblyopia.[18]

A study on the prevalence, type, and course of astigmatism in Chinese preschoolers, as well as its impact on refractive development, was carried out by DSP Fan et al in 2004. In certain kindergartens, a cross-sectional study of preschoolers was conducted. A cohort study was conducted on a portion of the kids five years following the original assessment. The primary study outcomes were axial ocular dimensions evaluated by ultrasonography and refractive error measured by cycloplegic autorefraction. The study involved 522 children, whose ages ranged from 27 to 77 months, with a mean of 55.7 months (SD 10.9). According to this study, astigmatism is very common among preschool-aged Chinese youngsters.[19]

2. Materials & Methods

My study comprised data from 60 astigmatic anisometropic patients who visited Holy Family Hospital's eye outpatient department in Rawalpindi between August 15, 2018, and January 15, 2019. The data were gathered using consenting sampling.Version 22 of SPSS was utilized to analyze the data. An age-neutral cross-sectional descriptive study design was employed. During the ophthalmic examination, the pupillary reflex was tested for strabismus, ocular movements, cover-uncover testing, visual acuity testing using the Snellens chart, and slitlamp biomicroscopy for the anterior chamber and fundus. Adults' refractive error was assessed subjectively (with the use of an autorefractometer and retinoscopy), but children's cycloplegia was produced by three injections of 1% cyclopentolate, spaced ten minutes apart, in both subjects' eyes (with the use of an autorefractometer and retinoscope). Verification of a red fundal reflex was done following pupillary dilation. Following a thorough examination, astigmatism was examined and the most effective treatment options were evaluated. patients less than 18 years old, of both sexes.Among the respondents are patients who reported headaches, blurred vision, eye strain, and trouble seeing far away. Patients who have cataracts or pseudophakic in one or both eyes, ptosis, or other abnormalities of the eyelids.The research study excluded the use of dilating drops in cases of fever or allergic responses, penetrating eye injuries, and fundus anomalies.

3. Results

Data was analyzed by using Statistical Package for Social Sciences (SPSS). There were 31 males and 29 female among the 60 patients presented with astigmatism. The patients comprised of various age groups. 21 (35%) were between the age of 4-8 years, 22(37%) were of 9-13 years of age and 17(28%) were among the age of 14-18 years. In children of 4-8 years presented with astigmatism, 20% had myopia, 47.1% had hyperopia and 50% had mixed refractive astigmatism. Myopic astigmatism was found to be 34.5%, hyperopic astigmatism 41.2% and mixed astigmatism 35.7% in 22 patients between the age of 9-13 years. In the age group of 14-18 years, 34.5% had myopic astigmatism, 41.2% had hyperopic astigmatism and 35.7% had mixed refractive astigmatism. 49(82%) of the total 60 patients had with the rule astigmatism. 60% males were found to have anisoastigmatism of 1D. A higher incidence of anisometropia with astigmatism (57.1%) was seen in the age group of 4-8 years. Association of anisometropia with amblyopia was also observed. The non amblyopic eyes were found to have a higher prevalence of anisoastigmatism (65%) than the amblyopic eyes (25%). Age based differences with regard to anisometropia were found using the Chi square test, which was utilized to confirm the relationship between age, gender, and amblyopia with

anisoastigamtism. It was also found that anisometropia does not correlate with amblyopia or gender. There was no evidence linking ambyopia to aging.

4. Discussion

The optical characteristics of anisometropic eyes unrelated to strabismus or disease were examined in this work. Aniso-astigmatism, the difference between the cylinder component of refraction, was found to be present in all of the 60 patients that were studied for research purpose at the following frequencies: 13 (21%) in <1D, 25 (41%) in 1D, and 22 (46%) in >1D. Males exhibited a higher frequency of 51% (31). With the rule astigmatism was seen to be more common in males, which is in contrast to a 2013 study by Abbasi S et al. Astigmatism was seen to be more common among preteenagers (9–13 years old) based on age groups, as per a number of studies (Dobson V, Fulton AB et al 1984), (Gwiazda J, Scheiman M et al 1984), (Cowen L, Bobier WR et al 2003), (Shankar S, Bobier WR et al 2004).These investigations have demonstrated that WTR astigmatism is most common in young adults. The prevalence of myopic astigmatism was higher (29; 48%) compared to hyperopic (17; 28%) and mixed (14; 23%). Similar findings have been made by Fulton AB et al. (1982), Gwiazda J, Grice K et al. (2000), Tong L, Saw S-M et al. (2002), and Fairbrother JA et al. (2004) about the correlation between astigmatism and myopic refractive errors. According to Fulton AB et al. (1982), uncorrected astigmatic errors may have an impact on the onset of myopia and may act as a trigger for the development of myopia due to optical blur. Contrary to several studies (Goss DA, Shewey et al 1990; Pärssinen TO et al 1991), these researchers discovered that astigmatism, both its presence and alterations, was linked to an enhanced progression of myopia. Similar to previous investigations (Weakley et al 2001), amblyopia was discovered in hyperopic astigmatism (10; 47.6%) and myopic (7; 33%) cases. When one eye has a higher refractive error than the other, there is a unilateral decrease in visual acuity, which is known as anisometropic amblyopia. With hyperopic anisometropia, an interocular difference of 1D might cause the affected eye to have reduced acuity during both near and distance fixation, which can suppress the more hyperopic eye. Asymmetric hyperopia is usually the cause of this type of amblyopia. Aniso-astigmatism of >1D was observed to have a 52% amblyopia magnitude. This demonstrates that the degree of anisometropia is correlated with amblyopia. Tanlamai and Goss et al. (1979), Hardman Lea et al. (1989), and Townshend et al. (1993) all produced findings that were similar.

Limitations of my study include one hospital and smaller sample size. A larger sample size and more than on hospitals could give better results.

Conclusion:

Myopic astigmatism is clearly indicated by the study's results, and with the rule astigmatism is more common. The current study's results also show that aniso-astigmatism refractive defects may cause amblyopia, lazy eye, a serious problem for low vision. Hyperopic refractive defects can lead to amblyopia, therefore, screening is necessary. Since amblyopia is most sensitive between the ages of one and seven, screening is crucial for preteens in order to prevent or lessen the condition.

Conflict of Interest:

The authors declared no conflict of interest.

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