

PREVALENCE OF ASTIGMATISM IN MYOPIC PATIENTS A STUDY DONE AT HITEC IMS

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ABSTRACT

Objective: The objective of this study was to find the prevalence of astigmatism in myopic patients concerning age and gender.

Study Design: It was a descriptive study.

Settings: It was done at HITEC-IMS Taxila from March 2022 to July 2022.

Methodology: In our study, 370 patients were included, all of them were myopic. Patients with complaints of blurred vision and age 18 to 40 years were included in our study. Patients who had undergone LASIK surgery or had congenital myopia were excluded from our study.

Results: Astigmatism was 77.3% in myopic patients, 44.6% were males and 55.4% were females. Prevalence was high in patients 29-31 years old.

Conclusion: Astigmatism was more prevalent in myopic patients, ranging from 29 to 31 years of age.

Keywords: Astigmatism, Myopia, Lasik surgery, Congenital Myopia, Ametropia

INTRODUCTION

Astigmatism is the most prevalent ametropia in individuals. Even less has been discovered about the origin of astigmatism and the facts surrounding the spherical and astigmatic refractive error relationship.¹ According to WHO data published a few years ago, half of the world's population (about five billion people) will be myopic in 2050. Only if there is no change in people's lifestyles, no lifestyle adjustment, and no adoption of prevention techniques would the expected outcomes be completely accurate.² With increasing age, the likelihood of astigmatism more than one diopter reduces.³ These people require spectacles and visual aids with ophthalmic corrections since their optical derangements differ from those with emmetropic eyes.⁴ In children, astigmatism is a

prevalent eyesight condition. Uncorrected astigmatism has been linked to refractive problems including myopia and amblyopia in previous research. It is critical to discover and correct astigmatism as soon as possible to avoid the potential impact of undetected astigmatism on a child's normal eyesight development. The exact reason for astigmatism in children is not discovered yet. Juvenile age group, people belonging to Spain, African American ethnicity, the existence of significant vision impairment (myopia or hyperopia), as well as maternal smoking during pregnancy, have all been established as risk factors for astigmatism in young children in the United States.⁵

Astigmatism is associated with the establishment and progression of myopia in children in several studies (reviewed in Grosvenor & Goss, 1998). The relation of early-onset myopia with against-the-rule astigmatism is occasionally the reason for spherical equivalent and cylindrical refractive error. Neonates with against-the-rule astigmatism and a negative spherical equivalent experienced early onset of myopia at an early age than neonates with either with-the-rule or no astigmatism,

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according to a longitudinal study of refraction. In young children, astigmatism against the rule is an indication of the occurrence of myopia later in life and faster progression of existing myopia. These results show that there is a link between cylindrical refractive error and spherical equivalent.⁶

Astigmatism has been linked to the development of amblyopia as well as the advancement of myopia. When astigmatism is present in a growing visual system, its consequences may be more pronounced.⁷ Myopia, according to the studies, is a major public health issue that requires prompt planning for comprehensive vision care services to prevent rapid growth in high myopia. Time spent outside and less time spent indoors, including increasing use of electronic devices and activities that require close focus, can be part of effective preventive efforts, as can new coping techniques, under-correction, Bifocals, Pals, or pharmaceutical therapies.²

The incidence of astigmatism is increasing in children as well as young adults. This study aimed to find the relation between myopia and astigmatism and to take proper measures to overcome the disease. To assess astigmatism, patients were examined by an autorefractometer.

MATERIALS AND METHODS

It was a descriptive study, done from March 2022 to July 2022.

Refraction data was collected from 370 subjects, who were all myopic. In our study, there were 165 males and 205 females. The sample was collected through convenience sampling. This study was approved by the institutional review board. Patients visiting eye OPD with myopia and with complaints of blurred vision were included in the study. Patients aged 18 to 40 years were included in our study and patients who had undergone LASIK surgery or had congenital myopia were excluded from the study. No patient had strabismus, cataract, or significant eye disease.

Informed consent was obtained from patients before collecting their data. The data were collected by examining patients on an autorefractometer and their age and gender were noted and analyzed on SPSS.

RESULTS

A total of 370 patients were tested for astigmatism, there were 44.6% males (n=165) and 55.4% (n=205) were females. All of the patients were myopic, of age ranging from 18-40 years with a mean age of 28 years \pm 3 months, S.D. 6.0. In 77.3% (n=286) of patients

astigmatism was present. Astigmatism was more prevalent in females 55.4% (n=160) as compared to males $\Phi=0.20$, Prevalence of astigmatism was high among the age group of 29-31 years, $\Phi=0.3$.

Table I: Shows distribution of gender and presence of astigmatism

Gender	Males	44.6%	(n=165)
	Females	55.4%	(n=205)
Presence of astigmatism	Yes	77.3%	(n=286)
	No	22.7%	(n=84)

Table II: Correlation of Gender with Astigmatism

		Presence of astigmatism		Total
		No	Yes	
Gender	Male	39	126	165
	Female	45	160	205
Total		84	286	370

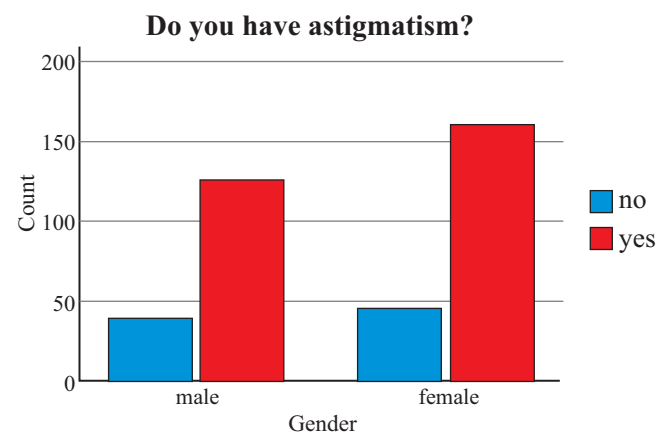


Figure 1: Distribution of Astigmatism among males and females

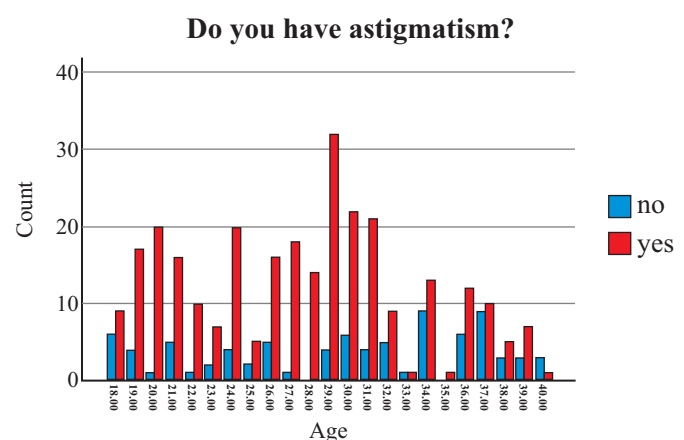


Figure II: Shows Distribution of Astigmatism According to Age Group

DISCUSSION

In this study, we studied the relationship of astigmatism

with age and gender in myopic patients. 77% of patients had astigmatism, out of the 44.6% were male and 55.4% were female. This shows that astigmatism is more prevalent in females than in males. We studied patients from the age of 18 to 40 years, our study showed that it is more prevalent in 27 to 32 years of age. In these patients, we looked at the connection between astigmatism with age and gender. Astigmatism is more common in women than in men, according to this study. Astigmatism is caused by asymmetries in the anterior portion of the eye. Asymmetries include ocular curvature or dispersion, frontal curvature, decentration, or slant, and position of the pupil.⁸ The occurrence of astigmatism is largely associated with age and other factors, according to several research. Some researches, however, show no association in the occurrence of astigmatism in children aged 6 to 12, while the bulk of studies show a considerable drop in astigmatism from birth to puberty, followed by an increase in adulthood.⁹ According to one study, children had a 15% prevalence of astigmatism, whereas adults had a 40% prevalence. This indicates that astigmatism is more common in adults than in youngsters. The prevalence of astigmatism, on the other hand, varies widely between studies, ranging from 0.3 percent in Thailand to 91.9 percent in Benin. South-East Asia has the lowest prevalence of astigmatism, while Americans have the highest prevalence. However, astigmatism is very common in the Eastern Mediterranean and Western Pacific regions.¹⁰ According to a study conducted in Singapore, astigmatism is less common in Singapore school children than in Singapore adults and teenagers¹¹ This is consistent with our findings, which show that adult prevalence is high. According to studies conducted in Poland, Malaysia, China, and Ethiopia, children aged 6 to 12 years have a decreased prevalence of astigmatism.⁹

Gender has a major effect on astigmatism, with males being positively associated with RA and poorly associated with CA. The occurrence of RA increased with advancing age and was most common in those who were >70 years old, according to one study; age was a prime predictor of RA, associated with an increased chance of occurrence of the refractive change in middle age; and a directional shift in the degree and type of RA was also identified with age.¹² Refraction studies in children have revealed that astigmatism development in childhood is a dynamic process, with newborns having a high incidence of astigmatism, which is predominantly corneal in origin. The cornea flattens in early childhood,

reducing the degree of astigmatism. Up to the age of four years, the prevalence of greater degrees of astigmatism is minimal. However, it should be emphasized that CA is more prevalent in the younger age group (5–10 years) than in the older age group.¹² Although one study found no difference in the prevalence of astigmatism between men and women, the results of other studies in this area are mixed. Females were found to have a higher prevalence in some studies, whereas males were not shown to have a higher incidence in others.⁹ According to a Chinese study, the frequency of astigmatism in preschool children varies by area. According to previous studies, the prevalence of astigmatism ranged from 4.0 to 25.4 percent depending on the defining criteria used. According to research conducted in Wuxi, 36.0 percent of preschool children had astigmatism.¹³ According to a study conducted in YiWu, the overall prevalence rate of astigmatism was 14% for astigmatism of 1.5 D or larger and 2% for high astigmatism of 3.0 D or greater. Astigmatism was more common in male students as they progressed through the grades. Astigmatism prevalence varies with race and ethnicity, as is well documented¹⁴ In different studies and populations, the prevalence of astigmatism varies. This difference could be caused by age, gender, or environmental variables. In comparison to previously published research, the findings of a Chinese study showed a significant prevalence of astigmatism in Chinese preschool children. Astigmatism (>1.00 D) was detected in 21.1 percent of preschool children in that study (mean age 55.7 months). According to Howland et al, one out of every ten children aged 4 and up had astigmatism of 1.00 D or more. According to Dobson et al, astigmatism of 1.00 D or greater was identified in 25% of children aged 1–48 months. Mayer also discovered that astigmatism (>1.00 D) affected 25% of children in the same age group. Astigmatism is common among Chinese people.¹⁵

CONCLUSION

Astigmatism was more prevalent in myopic patients, ranging from 29 to 31 years of age.

Further studies are needed on this subject to find the correlation between myopia and astigmatism.

Conflict of interest: The authors declared no conflict of interest.

Authors Contribution

Najeeba Harim: Analysis / Interpretation / Discussion, Manuscript Writing, Experimentation / Study Conduction

Shahzad Waseem: Conception of study / Designing / Planning, Experimentation / Study Conduction

Dilshad Alam Khan: Conception of study / Designing / Planning, Critical Review

Umm e Aiman: Experimentation / Study Conduction, Facilitated for Reagents / Material Analysis

Syed Muhammad Ali Haider: Analysis / Interpretation / Discussion, Manuscript Writing

Warda Altaf: Manuscript Writing

REFERENCES

1. Nemeth G, Szalai E, Berta A, Modis L Jr. Astigmatism prevalence and biometric analysis in normal population. *Eur J Ophthalmol.* 2013;23(6):779-83. doi: 10.5301/ejo.5000294. Epub 2013. PMID: 23640506.
2. Parrey MUR, Elmorsy E. Prevalence and pattern of refractive errors among Saudi adults. *Pak J Med Sci.* 2019;35(2):394-8. doi: 10.12669/pjms.35.2.648. PMID: 31086521; PMCID: PMC6500803.
3. Rowland HC, Sayles N. Photokeratometric and photorefractive measurements of astigmatism in infants and young children. *Vision Res.* 1985;25(1):73-81.
4. Atchison DA, Jones CE, Schmid KL, Pritchard N, Pope JM, Strugnell WE et al. Eye shape in emmetropia and myopia. *Investig Ophthalmol Vis Sci.* 2004;45(10):3380-6.
5. Wang J, Cheng QE, Fu X, Zhang R, Meng J, Gu F et al. Astigmatism in school students of eastern China: prevalence, type, severity and associated risk factors. *BMC Ophthalmol.* 2020;20(1):155. doi: 10.1186/s12886-020-01425-w. PMID: 32306963; PMCID: PMC7168812.
6. Gwiazda J, Grice K, Held R, McLellan J, Thorn F. Astigmatism and the development of myopia in children. *Vision Res.* 2000;40(8):1019-26. doi: 10.1016/s0042-6989(99)00237-0. PMID: 10720671.
7. Fan DS, Rao SK, Cheung EY, Islam M, Chew S, Lam DS. Astigmatism in Chinese preschool children: prevalence, change, and effect on refractive development. *Br J Ophthalmol.* 2004;88(7):938-41. doi: 10.1136/bjo.2003.030338. PMID: 15205242; PMCID: PMC1772230.
9. Hashemi H, Asharlous A, Khabazkhoob M, Yekta A, Emamian MH, Fotouhi A. The profile of astigmatism in 6-12-year-old children in Iran. *J Optom.* 2021;14(1):58-8. doi.org/10.1016/j.optom.2020.03.004
10. Hashemi H, Fotouhi A, Yekta A, Pakzad R, Ostadimoghaddam H, Khabazkhoob M. Global and regional estimates of the prevalence of refractive errors: Systematic review and meta-analysis. *J Curr Ophthalmol.* 2018;30(1):3-22. doi.org/10.1016/j.joco.2017.08.009
11. Tong L, Saw SM, Carkeet A, Chan WY, Wu HM, Tan D. Prevalence rates and epidemiological risk factors for astigmatism in Singapore school children. *Optom Vis Sci.* 2002;79(9):606-13. doi: 10.1097/00006324-200209000-00012. PMID: 12322931.
12. Sanfilippo PG, Yazar S, Kearns L, Sherwin JC, Hewitt AW, Mackey DA. Distribution of astigmatism as a function of age in an Australian population. *Acta Ophthalmol.* 2015;93(5):e377-e385. doi: 10.1111/aos.12644. Epub 2015.13. PMID: 25585855.
13. Yang Z, Lu Z, Shen Y, Chu T, Pan X, Wang C et al. Prevalence of and factors associated with astigmatism in preschool children in Wuxi City, China. *BMC Ophthalmol.* 2022;22(1):1-9. doi.org/10.1186/s12886-022-02358-2
14. Wang J, Cheng QE, Fu X, Zhang R, Meng J, Gu F et al. Astigmatism in school students of eastern China: prevalence, type, severity and associated risk factors. *BMC Ophthalmol.* 2020;20(1):155. doi: 10.1186/s12886-020-01425-w. PMID: 32306963; PMCID: PMC7168812.
15. Tsao WS, Hsieh HP, Chuang YT, Sheu MM. Ophthalmologic abnormalities among students with cognitive impairment in eastern Taiwan: The special group with undetected visual impairment. *J Formos Med Assoc.* 2017;116(5):345-50. Available from: <http://dx.doi.org/10.1016/j.jfma.2016.06.013>