



Original Article

Association Between Corneal Opacity Location and Amount of Astigmatism

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Purpose: To determine the association between corneal opacity location and amount of astigmatism.

Method: It was an institution based study, conducted on a sample of 35 patients having corneal opacity with age limits 15-55 years. Refraction of Patients having different refractive error was performed at Clinical skills lab of College of Ophthalmology and Allied Vision Sciences, Mayo Hospital Lahore.

Results: Most of the studied patients had astigmatism. Among them, the most prevalent type was With The Rule Astigmatism. The pattern was not coherent on the basis of age and gender such that the middle aged patients and males had more vulnerability to astigmatism. It was further observed that opacity in the vertical meridian was greater than the rest.

Conclusion: After a thorough analysis of the data collected from the sample of 35 patients, I concluded that majority of the patients who suffered from corneal opacity, also had astigmatism. Those with both opacity and astigmatism had either vertical or peripheral opacity with vertical opacity the most prevalent type. While the 10 patients who did not have astigmatism had central opacity. Hence it was identified that there was no vision in such patients. Moreover, among the patients with astigmatism, With the Rule Astigmatism was the most common followed by Against the Rule Astigmatism and Oblique Astigmatism was the least prevalent. Further it was observed that middle age group and old aged people showed a pattern of highest number of the disease.

Key Words: Corneal Opacity, Astigmatism

Introduction

Cornea is an optically clear and translucent structure. Corneal disorders may happen due to the accumulation of additional products (e.g., fluid, inflammatory, debris, scar tissue, metabolic byproducts) within one or many layers of the cornea, resulting in the loss of corneal transparency. This loss in clarity of cornea is known as corneal opacity.¹ Corneal opacity further causes one of the refractive errors called astigmatism wherein the spherical shape of cornea adopts an irregular shape.² Corneal diseases are the second largest cause of blindness in majority of third world countries. Corneal opacity can be classified as: Minor corneal opacity, Peripheral corneal opacity and Central corneal opacity.³

Some of the causes that include nutritional, infectious, inflammatory, iatrogenic, inherited, and degenerative conditions. Disease pattern is unique in different environments. Overall, in underdeveloped and developing countries, infectious keratitis presents the most common cause. Symptoms include Redness, Photophobia, Pain, and decrease of vision.⁴ A cross sectional study during September 2014 till February 2016 in the outdoor clinic, the Prevalence of the mentioned disease was 2.35% among the study population. Corneal opacity was reported to be much higher in the elderly probably due to a weakened immune system and among cases with poor personal hygiene. According to the most recent WHO global data on the causes of blindness (2002) 'corneal opacities' affected 1.9 million people. The most common causes of corneal opacity were trauma (51.1%) and microbial keratitis (26.70%).⁵

Astigmatism is caused when rays of light do not meet at a common focal point. The cornea of the normal eye bears a uniform curvature, resulting in even refracting power over its whole surface. Most of the astigmatic corneas are found normal. In some patients, however, the shape of cornea is different and the curvature in one meridian is greater than another. There are two curves in cornea, one curve is steeper and the other is flatter.⁶

When light rays are refracted by such cornea, they are not focused on a single point, and retinal images of objects, whether far and near are unclear and may seem elongated or broadened. This refractive error is termed as astigmatism.⁷ Total astigmatism is categorized into lenticular astigmatism, corneal astigmatism, and retinal astigmatism. Corneal astigmatism results from abnormalities of corneal curvature. It happens to be the most usual cause of astigmatism.⁸ Corneal and non-corneal factors result in total astigmatism. Corneal astigmatism is caused mainly because of an irregular corneal frontal surface. In 10% people, the effect is corrected by the posterior surface. The posterior surface curvature of the cornea is usually not taken into account in most studies.⁹

Signs and symptoms include the following: headaches, eyestrain, squinting, distorted or blurred vision at all distances and difficulty driving at night.

Astigmatism greater than 0.5 D is more frequent among aged people, and the occurrence rises with age. The frequency of astigmatism is being reported about twenty percent higher in male patients than female. However, the occurrence of some patterns defined as irregular can be as high as forty percent, and considerable irregularity may exist in the posterior corneal surface. Corneal and non-corneal factors result in total astigmatism. Corneal Astigmatism is to a greater extent because of Aspheric Corneal Anterior Surface. In ten percent of patients the effects were mitigated by the posterior surface; the curve of the posterior surface of the cornea due to difficulty in its measurement is not considered in most studies.

It may be said doubtlessly that the most authentic cause of astigmatism is yet to be known. Many explanations could be given. One such explanation for astigmatism is that astigmatic refractive errors are most possibly genetically determined. Other doable causes may be involuntary contact between cornea and the pressure of eye lids, or extra eye muscles, or a 'visual feedback model' wherein astigmatism forms as a result of visual cues. Astigmatism can be classified into two types; Regular Astigmatism and Irregular Astigmatism. Regular Astigmatism can further be divided into; a) With the rule astigmatism b) Against the rule and c) Oblique astigmatism. They do not respond positively to a same treatment for all. With the rule astigmatism is cured with a plus cylinder lens in the range of 60-120 degree. A plus cylinder lens ranging from 30-150 is used for against the rule astigmatism. While the last type of astigmatism i-e Oblique Astigmatism responds highly to the lenses in the ranges between 30-59 and 121-149 degrees.

Study Design, Materials & Methodology

This research was a cross sectional study. Patients and students coming at Mayo Hospital OPD and COAVS respectively were sampled by judgmental sampling and it was concluded to take a sample of 35 patients/students. Data was collected through self-designed Performa.

Results

Table 1 shows opacities of cornea at different locations

Corneal opacities locations	Frequency	Percent
Vertical meridian opacity	9	25.7
Horizontal meridian opacity	5	14.3
Opacity in oblique meridian	7	20
Central opacity	10	28.6
Peripheral opacity	4	11.4
Total	35	100

In this study it was found that opacities in the central position of the cornea were most in number, which is 28.6% of the total participants in this study. Second most common opacities were in vertical meridian of the cornea, 25.7% to be exact as shown in the above table as well as in the figure. The least were having opacities in horizontal and peripheral location of the cornea.

Fig 1 shows opacities of cornea at different locations.

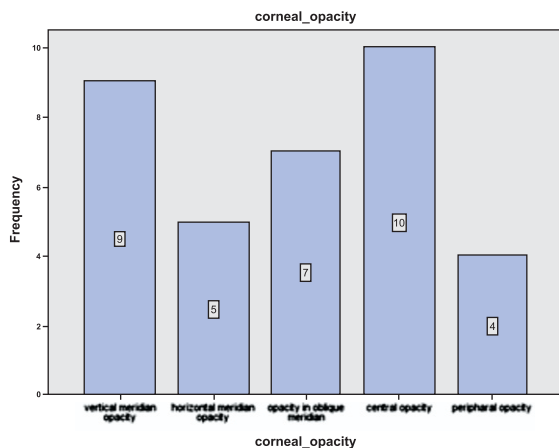


Table 2 shows different type of astigmatism in the participants.

Astigmatism Types	Frequency	Percent
with the rule	15	42.9
against the rule	11	31.4
oblique	9	25.7
Total	35	100

The above table shows different types of astigmatism found in our study. There are three main types of it i.e. with the rule, against the rule and astigmatism in oblique position. The most common type of astigmatism was with the rule which was 42.9 %, 31.4% of the participants were having against the rule type of astigmatism. Oblique astigmatism was the least found.

Discussion

I conducted a cross sectional study of a total 35 patients of corneal opacity at Mayo Hospital Eye Ward, Lahore, in order to find out the amount of astigmatism. The complaint factor was not the same among all the patients. 22 of the total 35 complained blurred vision, while the remaining 13 patients besides blurred vision also showed pain, redness and more symptoms. As far astigmatism was concerned, 25 carried astigmatism while the rest 10 patients did not show any such signs. There was also not seen a coherent pattern of

having astigmatism based on the age groups. The results indicated that patients between 20-25 and 30-35 had the greatest vulnerability of astigmatism. While children and old aged patients had lower risks. Similarly, there was also observed a huge difference on gender basis, such that males were more prone to astigmatism than female. Further analyzing the data of patients on the basis of different categories of corneal opacity, the figures again showed slight differences. Out of the total 25 patients with astigmatism, 9 patients had vertical meridian opacity, 5 had horizontal opacity, 7 had opacity in oblique meridian, and 4 patients had peripheral opacity.

Analyzing the patients on the basis of the types of astigmatism, 43% were with the rule astigmatism, 31.4% against the rule astigmatism, 25.7% were oblique astigmatism. Corneal opacity and astigmatism are associated with each other. There are greater chances of astigmatism prevalent in patients with corneal opacity.

Conclusion

After a thorough analysis of the data collected from the sample of 35 patients, I concluded that majority of the patients who suffered from corneal opacity, also had astigmatism. Those with both opacity and astigmatism had either vertical or peripheral opacity with vertical opacity the most prevalent type. While the 10 patients who did not have astigmatism had central opacity. Hence it was identified that there was no vision in such patients. Moreover, among the patients with astigmatism, With the Rule Astigmatism was the most common followed by Against the Rule Astigmatism and Oblique Astigmatism was the least prevalent. Further it was observed that middle age group and old aged people showed a pattern of highest number of the disease.

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