

Association of Astigmatism with Allergic Conjunctivitis

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ABSTRACT

Objective: To determine the association of astigmatism with allergic conjunctivitis.

Study Design: Prospective observational study.

Place and Duration of Study: Armed Forces Institute of Ophthalmology, Jun to Dec 2023.

Methodology: The study had 359 patients, and convenience sampling was performed. Baseline data was collected related to demographic characteristics, past medical history and co-morbidities. Allergic Conjunctivitis was diagnosed through examination with a slit-lamp. Astigmatism was diagnosed by measuring the refractive power of both eyes using an Automated Kerato Refractometer. Patients were pre-evaluated for Astigmatism and they were followed for period of 6 month. And post evaluated after 3 weeks, 3 months and 6 months. Data was collected, entered and analyzed in SPSS version 26.0. Chi Square test was applied and $p < 0.05$ was considered as significant.

Results: Out of 359 patients, 176(49.02%) were male and 183(50.98%) were females. Patients were pre-evaluated at baseline for astigmatism and none reported condition. At baseline (week 1) 27(7.53%) of them had the disease. At the 6th month follow-up, astigmatism in patients rose to 202(56.26%) respectively. The data analysis showed a significant association of Astigmatism with allergic conjunctivitis at the 6th-month follow-up (p value < 0.001).

Conclusion: Astigmatism is significantly associated with allergic conjunctivitis.

Keywords: Allergic Conjunctivitis, Association, Astigmatism.

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INTRODUCTION

A group of inflammatory conditions known as ocular allergic conjunctivitis typically first appear in children and are typically the result of type 1 hypersensitivity reactions.¹ Over the past few decades, allergic disorders have become more common in developed nations, and allergies have grown to be a serious public health concern that costs the social sector a lot of money. Among many other allergic diseases, allergic conjunctivitis is a prevalent ophthalmic ailment that can interfere with social activities by causing a variety of ocular problems, including hyperemia, burning sensations, itching, and tearing on the ocular surface.² AC, or allergic conjunctivitis, is a prevalent allergy illness. The morbidity of AC is particularly troublesome in all ages, and it has progressively emerged as one of the most common eye conditions in children.³ 5-22% of the human population is thought to be affected by allergic conjunctivitis; however, the precise prevalence varies depending on location and geographic region.⁴ A prevalence of 19% has been found in Pakistan.⁵ The two most prevalent types of allergic conjunctivitis,

seasonal allergic conjunctivitis (SAC) and perennial allergic conjunctivitis (PAC), are among the five varieties that exist. The comparatively minor symptoms of PAC, which is brought on by ticks, animal hair, or house dust, persist throughout the year. IgE-mediated allergic conjunctivitis comes in mild forms, such as SAC and PAC. Conversely, uncommon forms of allergic conjunctivitis such as giant papillary conjunctivitis (GPC), vernal keratoconjunctivitis (VKC), and atopic keratoconjunctivitis (AKC) are frequently linked to corneal issues.⁶ The lack of a thorough investigation into the cause of allergic conjunctivitis leads to an under-diagnosis and under-treatment of the condition. This raises the possibility of developing ocular allergy-related problems, such as an increase in corneal astigmatism, keratoconus, and corneal ulcers.^{7,8} Although the underlying mechanisms remain unclear, increased inflammatory molecules and proteases and itch-provoked eye rubbing were thought to contribute to the development and progression of KC in AC patients.⁹ The likelihood of developing KC has been linked to a number of allergic ocular disorders, such as atopic keratoconjunctivitis (AKC), seasonal allergic conjunctivitis (SAC), perennial allergic conjunctivitis (PAC), and vernal keratoconjunctivitis (VKC).¹⁰

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Astigmatism, a common refractive error affecting vision quality, and allergic conjunctivitis, an inflammatory reaction of the eye, are both prevalent among the population. This research aims to explore potential correlations between these conditions, considering how allergic inflammation might impact the development or exacerbation of astigmatism. Understanding such associations could contribute to improved diagnostic and management strategies for patients experiencing both conditions concurrently. By highlighting this relationship in the title, the study aims to attract attention from researchers, clinicians, and stakeholders interested in ocular health, fostering further investigation and potentially influencing clinical practices in optometry and ophthalmology.

METHODOLOGY

This Prospective observational study was carried out on 359 patients between June to December 2023. Sample size was calculated using WHO sample size calculator taking confidence interval 95%, margin of error 5%, reported prevalence of Astigmatism as 37%.¹¹ Patients aged 20 to 80 years reporting to Armed Forces Institute of Ophthalmology were included in the study. Non-Probability Convenience Sampling was performed. The study commenced after due approval of methodology and concept by Ethical Committee of Armed Forces Institute of Ophthalmology Rawalpindi ERC no 310/ERC/AFIO. Also written informed consent was taken from patients and from next of kin in cases where the patients were unable to give consent.

Inclusion Criteria: Patients age 15 – 80 years, who give informed consent, patients having symptoms of allergic conjunctivitis

Exclusion Criteria: Subjects who have a history of posterior segment diseases, prior ocular surgery, corneal problems or prior astigmatism.

On enrollment, complete medical and allergy histories as well as information about current pharmacologic treatments, were acquired. Baseline data was collected related to demographic characteristic, past medical history and co-morbidities. Allergic Conjunctivitis was diagnosed through ocular examination with a slit-lamp to determine the presence of conjunctival papilla, chemosis, blepharitis and to identify any corneal lesions. The refractive power of both eyes was measured using an Automated Kerato Refractometer. The spherical power, cylindrical power, spherical equivalent and keratometry readings were measured. The refraction

power was measured at intervals of 0.25 diopter (D); myopia was indicated by (-) D and hyperopia by (+)D. The spherical equivalent was calculated as follows: (spherical D) + (1/2 x cylindrical D). Refractive power of both eyes was measured, but only data from the right eyes were used for analysis. Patients were pre-evaluated for Astigmatism and they were followed for period of 6 month. In addition, post evaluated after 3 weeks, 3 months and 6 months.

Statistical Package for Social Sciences (SPSS) version 23.0 was used for the data analysis. Quantitative variables with normal distribution were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

Out of a total of 359 individuals with allergic conjunctivitis, 176(49.02%) were male, and 183 (50.98%) were females. The Age distribution can be seen in Table-I.

Table-I: Demographic Characteristics of Respondents (n=359)

Age Distribution	n (%)
15-30 years	159(44.28%)
31-45 years	162(45.12%)
>45 years	38(10.58%)

Table-II and Table-III illustrate the presence of astigmatism in our sample at pre-evaluation, at baseline, and at follow-ups. The development of astigmatism was observed in 202 patients (56.26%) after 6 months, indicating a statistically significant difference from baseline (*p* value < 0.001), suggesting a potential association between astigmatism development and allergic conjunctivitis.

Table-II: Astigmatism Among Study Sample at Baseline and Follow-Ups (n=359)

Parameters	Allergic Conjunctivitis			
	Pre-evaluation (Week 0)	Baseline (Week 1)	Follow up 1 (3 months)	Follow up 2 (6 months)
Astigmatism				
Yes n (%)	359 (100%)	27(7.53%)	159(44.28%)	202(56.26%)
No n (%)	0 (0%)	332(92.47%)	200(55.71%)	157(43.74%)

Table-III: Association of Astigmatism and Allergic Conjunctivitis (n=359)

Parameters	Allergic Conjunctivitis		<i>p</i> -value
	Baseline (Week 1)	Last Follow up (6 months)	
Astigmatism			
Yes n (%)	27 (7.53%)	202(56.26%)	< 0.001
No n (%)	332(92.47%)	157 (43.74%)	

DISCUSSION

This Prospective study was carried out on 359 patients, and results here proved that astigmatism is significantly associated with Allergic conjunctivitis. This study is first of its kind in Pakistan, to evaluate the association between astigmatism and conjunctivitis. The results of present study is in favor of study carried out by R Arthi *et al.*, where they found that astigmatism is associated with AC, but they only focused on school children, present study include all person age 15 years or above.¹² The present study also favors the study carried out by Kim *et al.*, where both study confirmed that astigmatism is associated with AC in urban people.¹³ The results of present study is in favor of study conducted in Nigeria where they found that keratoconus is associated with AC.¹⁴ Children attending the urban school were also more likely than those attending the suburban school to get allergic conjunctivitis. The increased amount of allergens may account for the higher frequency of symptomatic allergic conjunctivitis in the urban school, even though the incidence of the allergic conjunctivitis-specific conjunctival papillary alterations is lower. Children who grow up in cities are more likely to be exposed to air pollution caused by traffic.¹⁵ In line with earlier research, our data also implies that sensitization to allergens, such as house dust mites and different kinds of pollen, may be the cause of allergic conjunctivitis in children.^{16,17} The current investigation attempted to determine that slightly increased astigmatism (cylindrical D) was caused by allergic conjunctivitis. Our research is consistent with earlier research, this study demonstrates a statistically significant correlation between the subjects' gender and astigmatism level. Additionally, the study demonstrates a strong association between allergic conjunctivitis and cylinder diopter astigmatism.¹⁸

CONCLUSION

Present study concluded that astigmatism is significantly associated with allergic conjunctivitis, in patients reported to tertiary care hospital.

Conflict of Interest: None.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MSN & SP: Data acquisition, data analysis, critical review, approval of the final version to be published.

MJ & FAK: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SS & SMZ: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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