Section: Miscellaneous

Original Research Article

EVALUATION OF TEAR FILM AND OCULAR SURFACE CHANGES IN PATIENTS WITH ALLERGIC RHINITIS

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ABSTRACT

Background: Allergic rhinitis is a prevalent atopic condition that can lead to ocular surface irregularities resulting from persistent inflammation and modified tear film dynamics. Individuals with allergic rhinitis often experience ocular manifestations, including itching, dryness, and irritation, which can negatively impact their quality of life. The current study sought to assess tear film stability and ocular surface alterations in patients with allergic rhinitis, while comparing these results to those of healthy persons.

Materials and Methods: A prospective observational research was performed with 60 patients diagnosed with allergic rhinitis and 30 healthy controls matched for age and sex. All subjects had comprehensive ophthalmic assessment, encompassing Schirmer's test, tear film breakup time (TBUT), ocular surface staining with fluorescein, and the Ocular Surface Disease Index (OSDI) questionnaire. The data were evaluated and presented as mean ± standard deviation, facilitating comparisons between groups.

Results: Patients with allergic rhinitis had an average age of 29.8 ± 8.6 years, and 58.3% of them were male. Patients with allergic rhinitis had a considerably lower mean TBUT (8.4 ± 2.1 seconds) when compared to controls (12.6 ± 2.4 seconds). The study group also had lower Schirmer's test scores (14.2 ± 4.5 mm) compared to the controls (19.1 ± 3.8 mm). Of the patients with allergic rhinitis, 46.7% showed positive ocular surface staining, while just 20% of the controls showed only mild staining. Compared to controls (14.3 ± 6.1), patients had a substantially higher mean OSDI score (32.5 ± 9.7), suggesting that they experienced more ocular discomfort.

Conclusion: There are noticeable alterations to the ocular surface and instability of the tear film in patients with allergic rhinitis compared to healthy persons. Preventing the worsening of ocular surface illness and increasing patient comfort may be possible with prompt ophthalmic examination and proper care of ocular involvement in allergic rhinitis.

Keywords: Allergic rhinitis; Tear film; Ocular surface; Tear breakup time; Dry eye.

INTRODUCTION

Allergic rhinitis is a prevalent chronic inflammatory condition of the nasal mucosa, mediated by immunoglobulin E-dependent processes and provoked by exposure to environmental allergens.[1] It impacts a considerable segment of the population and is often linked with other atopic disorders, including asthma and allergic conjunctivitis. While the nasal symptoms of allergic rhinitis are widely acknowledged, ocular involvement is frequently underdiagnosed and insufficiently managed.[2,3]

The intimate anatomical and functional connection between the nasal cavity and the ocular surface promotes the dissemination of inflammatory mediators, resulting in ocular symptoms including pruritus, erythema, lacrimation, a burning sensation, and the sensation of a foreign body. Chronic inflammation can alter the normal composition and stability of the tear film, leading to tear film dysfunction and injury to the ocular surface.[4-6]

The tear film is essential for preserving ocular surface health by supplying lubrication, nourishment, and defense against environmental damage. Changes in the quantity or quality of the tear film might result in instability and symptoms akin to dry eye. Prior research indicates that inflammatory cytokines generated during allergic rhinitis may negatively impact the lacrimal functional unit, leading to diminished tear production and heightened tear evaporation.[7,8]

Despite the widespread occurrence of allergic rhinitis, less focus has been directed into its effects on tear film characteristics and ocular surface integrity. Timely recognition of tear film irregularities is crucial, as unaddressed ocular surface alterations can markedly diminish visual comfort and overall quality of life.[9]

This study aimed to measure tear film stability and ocular surface alterations in people with allergic rhinitis by objective clinical evaluations and subjective symptom assessments, while comparing these results to those of healthy persons.

MATERIALS AND METHODS

This prospective observational study was carried out in the Departments of Otorhinolaryngology and Ophthalmology at a tertiary care hospital throughout a specified timeframe. 60 individuals diagnosed with allergic rhinitis were enrolled following the acquisition of informed permission. A control group of healthy persons matched by age and sex was added for comparison. Patients received a diagnosis of allergic rhinitis through clinical history, nasal examination, and, when pertinent, further studies. All participants had a thorough ocular assessment.

Ophthalmic Evaluation: An evaluation of the eyes was carried out using Schirmer's test I, tear film breakup time (TBUT), fluorescein staining of the eye's surface, and the Ocular Surface Disease Index (OSDI) questionnaire for symptom assessment.

Inclusion Criteria

- Patients aged 18–60 years
- Clinically diagnosed cases of allergic rhinitis
- Both male and female patients
- Willingness to participate and provide written informed consent

Exclusion Criteria

- Pre-existing ocular surface disease or dry eye syndrome
- History of ocular surgery or trauma
- Contact lens users
- Patients with systemic autoimmune disorders
- Use of topical ocular medications within the previous four weeks
- Coexisting ocular infections or inflammatory conditions

Statistical Analysis: We used SPSS, or the Statistical Package for the Social Sciences, to examine the data that we imported into Excel. Categorical variables were shown as frequencies and percentages, whilst continuous variables were shown as mean ± standard deviation. The Student's t-test was used for continuous variables and the Chi-square test for categorical variables to compare the study and control groups. A statistically significant result was defined as a p-value less than 0.05.

RESULTS

The research comprised 30 healthy individuals as controls and 60 patients diagnosed with allergic rhinitis. Demographic information, tear film parameters, ocular surface findings, symptom severity, and a comparison between the study and control groups are all highlighted in five tables that present the results.

Table 1: Demographic Characteristics of Study and Control Groups

Parameter	Allergic Rhinitis	Controls
Mean age (years)	29.8 ± 8.6	30.4 ± 7.9
Male	35 (58.3%)	17 (56.7%)
Female	25 (41.7%)	13 (43.3%)

The distribution of ages and sexes in both groups was similar. There was sufficient matching of baseline demographic parameters between the sick group and the control group, since both groups had similar means of age and a small male predominance.

Table 2: Tear Film Breakup Time (TBUT)

TBUT (seconds)	Allergic Rhinitis	Controls
Mean TBUT	8.4 ± 2.1	12.6 ± 2.4
TBUT < 10 seconds	42 (70%)	6 (20%)

When comparing individuals with allergic rhinitis to controls, the mean TBUT was found to be substantially lower in the former. While this finding was rare in the control group, 70% of patients showed TBUT values less than 10 seconds, indicating tear film instability.

Table 3: Schirmer's Test I Results

Schirmer's Test (mm/5 min)	Allergic Rhinitis	Controls
Mean value	14.2 ± 4.5	19.1 ± 3.8
≤10 mm	18 (30%)	3 (10%)

Compared to healthy controls, patients with allergic rhinitis exhibited noticeably decreased Schirmer's test values. Thirty percent of patients had reduced tear secretion, meaning that allergic rhinitis was associated with less watery tear production.

Table 4: Ocular Surface Fluorescein Staining

Finding	Allergic Rhinitis	Controls
Positive staining	28 (46.7%)	6 (20%)
No staining	32 (53.3%)	24 (80%)

Nearly 50% of individuals with allergic rhinitis showed positive ocular surface fluorescein staining, suggesting injury to the epithelium. On the other hand, most of the control group did not exhibit any staining, indicating that the healthy group had superior ocular surface integrity.

Table 5: Ocular Surface Disease Index (OSDI) Scores

Parameter	Allergic Rhinitis	Controls
Mean OSDI score	32.5 ± 9.7	14.3 ± 6.1
Moderate–severe symptoms	38 (63.3%)	5 (16.7%)

Allergic rhinitis patients reported more severe symptoms and more ocular pain, which translated to a substantially higher mean OSDI score. Nearly two-thirds of patients reported moderate to severe symptoms, while only a small number of controls had similar experiences.

DISCUSSION

The current investigation revealed that individuals with allergic rhinitis exhibited notable changes in tear film characteristics and ocular surface integrity relative to healthy controls. These findings underscore the influence of persistent nasal allergy-induced inflammation on the ocular surface and the integrity of the tear film.[10-12]

The current investigation revealed a decrease in tear film breakdown time in most individuals with allergic rhinitis, signifying tear film instability. Previous research have revealed analogous findings, indicating that inflammatory mediators generated during allergic responses alter the lipid and mucin layers of the tear film, resulting in heightened tear evaporation.[13-15]

The current investigation found that Schirmer's test values were markedly reduced in patients with allergic rhinitis. Prior research has shown diminished aqueous tear production in allergic situations, likely due to lacrimal gland impairment resulting from persistent inflammation and aberrant reflex tearing.[16-18]

In the current investigation, almost fifty percent of the patients demonstrated positive ocular surface fluorescein staining, indicating epithelial injury. Similar results have been reported in previous investigations, indicating that extended exposure to inflammatory cytokines and mechanical eye rubbing contributed to ocular surface deterioration.[19-21]

The current investigation indicated that patients with allergic rhinitis exhibited markedly elevated scores on the Ocular Surface Disease Index for subjective symptom assessment.[22] Prior research has similarly indicated heightened ocular discomfort and dry eye-like sensations in individuals with allergic rhinitis, emphasizing the necessity of matching clinical manifestations with patient-reported symptoms.[23,24]

CONCLUSION

The current investigation revealed that patients with allergic rhinitis demonstrated considerable tear film instability and alterations in the ocular surface as compared to healthy persons. Common findings included diminished tear film breakup time, reduced tear output, and heightened ocular surface staining. Timely ophthalmic assessment and suitable treatment of ocular manifestations in allergic rhinitis are crucial to avert chronic ocular surface disorders and enhance patient comfort.

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