Introduction

Ocular allergy does not cause major tissue damage, but it deteriorates patient’s quality of life grossly and its prevalence in general population might go up to 30% [1]. Certain factors such as industrialization, air pollution, global climate change and changes in personal hygiene contribute to individuals contact with the allergens and shapes their reaction to such [2]. Contact with allergens trigger an immune response which disrupts the corneal and conjunctival cell stability, especially the stability of goblet cells [3]. Environmental factors and cell loss due to inflammation impair tear components, which may lead to dry eye disease [4]. This can explain why dry eye disease and ocular allergy are frequently reported together in the literature [5].

Ocular allergy and dry eye disease can co-exist but usually their signs and symptoms mimic each other. This may lead to delay in proper treatment and even failure of treatment in patients who are not diagnosed accurately. Therefore, the aim of our study is to investigate concurrently appearing signs and symptoms of dry eye in a group of patients with symptomatic allergic conjunctivitis (AC).

Material and Method

Staging

This was a retrospective study conducted between April 2017 and June 2017. We collected data from the medical record files of the patients who were examined for itching, photophobia, irritation, and ocular pain and who were diagnosed as having seasonal and perennial AC at the Maltepe University Medical Faculty Hospital. Our institutional review board (the Ethics Committee of Maltepe University) approved the study protocol that adhered to the tenets of the Declaration of Helsinki.

141 patients with allergic symptoms constituted the case group and 138 patient without any allergic symptoms were included in the study as the control group. Inclusion criteria were no previous history of ocular surgery, no previous history of topical or systemic treatment for Dry Eye Disease (DED) and AC and having no acute or chronic diseases other than ocular allergy.

Technique

We extracted the data for Ocular Surface Disease Index (OSDI) scores, Breakup Time (BUT) values, Oxford scheme scores, before treatment for all enrolled patients. The OSDI test is a 12-question questionnaire that evaluates the symptoms of ocular irritation and its visual-related functions to assess DED severity with scores ranging from 0 to 100 [6]. The Schirmer test I measures the tear amounts on the eye surface by placing filter papers (SNO* Strips, Lab Chauvin, Aubenas, France) in the inferior fornix without topical anesthesia. The amount of wetting on the filter paper after 5min is recorded as the test result. For our study, we defined the results < 10mm in the Schirmer test as positive for DED [6].
In the tear BUT test, the inferior fornix is touched using saline-soaked fluorescein sticks (Fluorescein, Haagen–Streit International, Kœniz, Switzerland). The patients are asked to blink and then abstain from blinking until told to do so. The time from the first blink to the detection of dry area formation on the cornea is recorded as the BUT value. We used the BUT values < 8s to detect DED [7]. The Oxford scheme is a test to assess the state of the ocular surface using a fluorescein stick to stain the cornea, and the results are graded from 0 (no staining) to 5 (severe staining) [8].

**Results**

**Table 1: Gender and age distribution between case and control groups.**

|                | Case Group | Control Group | p    |
|----------------|------------|---------------|------|
|                | Mean ± s.d./n-% | Mean ± s.d./n-% |      |
| Age            | 18,9 ± 12,6 | 15,0          | 16,6 ± 10,1 | 13,0 | 0,323 | =
| Sex            | Female | 63 | 44,7% | 66 | 46,8% | 0,761 | x² |
|                | Male    | 78 | 55,3% | 72 | 51,1% |       |     |

*: Mann-whitney u test / x² Chi-square test
Case group: Patients with allergy.
Control group: Patient without allergy.

Gender and age distribution of the patients included in the study were shown in Table 1. There was no statistically significant difference between two groups for age and gender. Dry eye scores of participants were shown in Table 2. Statistically significant difference was detected between the dry eye scores of two groups.

**Table 2: Dry eye scores of participants.**

|                | Control Group | Case Group | p    |
|----------------|---------------|------------|------|
|                | Mean ± s.d. | Median | Mean ± s.d. | Median |      |
| OSDI           | 20,8 ± 6,7 | 20,5 | 23,7±7,1 | 20,5 | 0,008" |
| BUT            | 17,2 ± 2,9 | 16,0 | 16,3±2,9 | 16,0 | 0,020" |
| SCHIRMER       | 13,6 ± 1,6 | 14,0 | 12,7±1,6 | 13,0 | 0,008" |

m: Mann-whitney u test.
OSDI: Ocular surface disease index; BUT: Break up time; Case group: Patients with allergy; Control group: Patient without allergy.

30.49% of patients with ocular allergies had mild corneal staining, and 1.72% had severe corneal staining. All patients without ocular allergies had slight corneal staining and none of them had severe corneal staining. It was statistically significant. (p<0,05)

**Discussion**

Dry eye syndrome is a disease of the ocular surface and it is multifactorial. Activation of the inflammatory cascade is the reason lying beneath the diseases. Vernal and a topical conjunctivitis are considered among the causes for DED and dry eye like symptoms [9,10]. Inflammatory diseases of the ocular surface cover a wide spectrum in which ocular allergy, asthma, rinit and DED are also included. Most of the times signs and symptoms of allergic conjunctivitis and dry eye diseases are intertwined [11-13].

Previously in the literature it has been reported that dry eye symptoms tend to alleviate during autumn season, and this has been linked to allergic activation [14]. Itching is one of the most prominent symptoms of AC and studies have found that AC and DED are the primary reason underlying the itching [15]. In another study, it was found that tear breakup time was shorter in patients who had allergic conjunctivitis during childhood [16]. In a study conducted with 35 children with vernal conjunctivitis, it was reported that dry eye symptoms are more severe in vernal conjunctivitis, and even during the times of inactive signs and symptoms for ocular allergy, dry eye continued [17].

In another study, it has been shown that response to allergens is more severe individuals who are predisposed to ocular pathologies such as DED and AC [18]. In the other study, IgE levels were investigated, it has found dry eye symptoms to manifest more severely in patients who has ocular allergy signs and symptoms and it has been speculated that DED is a sub type of dry eyes syndrome without antigen and antibody positivity [19]. Additionally, it has been shown that tear stability is decreased in not only in individuals with AC but also in individuals with atopic dermatitis and allergic asthma [20]. The present study patients have allergic conjunctivitis had worse BUT, oxford score and Schirmer test than nonallergic patient and had lower OSDI questionnaire scores. So, these findings support the previous studies.

**Conclusion**

Ocular allergy and dry eye disease are two surface disorders that frequently co-exist. In symptomatic patients, a through approach is required and in order to reduce morbidity both disor-
ders should be included in the diagnostic workup, treatment and follow-up plan.

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