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Tears Stability in Acute Infective and Allergic Conjunctivitis

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Abstract

Objectives: The aim of this study is to evaluate the effect of acute conjunctivitis on tear film stability.

Material and Methods: Thirty three patiens (60 eyes) diagnosed with acute conjunctivitis were included in this study (Group 1). Twenty eyes of 10 healthy subjects (ages and sexes matching those of the study group) were considered as control group (Group 2). Group1 were divided into two subgroups. Twenty patients (34 eyes) diagnosed with acute infective conjunctivitis constituted Group 1-A while thirteen patients (26 eyes) diagnosed with acute seasonal allergic conjunctivitis were included in Group 1-B. Because of the fact that ocular surface may get impaired, patients using chronic treatment were excluded from the study. Besides, patients with contact lenses, blefaritis, or other ocular surface diseases were also left out.

Results: The average age of the patients was 28.8 ± 6.4 years (SD) whereas the mean age of the control group was 25.9 ± 5.9 years. Sexes were distributed equally in both groups. The mean tear break up time in acute conjunctivitis was 11.23±6.18 seconds in the study group and it was 23.50±4.45 seconds in the control group. $p<0.05$ tear break up time was considered statisticaly and significantly low in acute conjunctivitis cases.

Conclusion: Our results revealed that acute conjunctivitis may considerably alter tear film stability. The reason for the similarity between the majority of acute conjunctivitis symptoms and dry eye symptoms may be due to tear unstability caused by acute conjunctivitis.

Key Words: Tear Break Up Time; Conjunctivitis; Tear Film.

Akut İnfektif ve Alerjik Konjonktivitlerde Gözyaşı Stabilitesi

Özet

Amaç: Bu çalışmada akut konjonktivitlerin gözyaşı film stabilitesi üzerine etkilerini araştırmayı amaçlanmıştır.

Gereç ve Yöntemler: Çalışmaya akut konjonktivit tanısı konulup tedavisi başlanmamış 33 olgunun 60 konjonktivitli gözü (grup 1) ve kontrol gurubu olarak gözlük muayenesi için polikliniğe başvuran 10 normal sağlıklı olgunun (yaş ve cinsiyet uyumlu) 20 gözü (grup 2) dahil edildi. Konjonktivitli gözler ise akut infektif konjonktivit tanısı konulup tedavisi başlanmamış 20 olgunun 34 konjonktivitli gözü (grup 1-A), akut mevsimsel alerjik konjonktivit tanısı konulup tedavisi başlanmamış 13 olgunun 26 gözü (grup 1-B) olarak iki alt gruba ayrıldı. Tüm hastaların shirmer testi yapılarak anormal test sonucu olanlar çalışmadan çıkarıldı. Olgular seçilirken oküler yüzeyi bozabilecek oral antihipertansif, antihistaminik, antidepresan vb.sistemik ilaç veya kronik topikal ilaç tedavisi almaması, kontakt lens kullanmaması, blefaritlerinin olmaması, oküler yüzey hastalığı bulunmaması göz önüne alındı.

Bulgular: Olguların yaş ortalaması 28.8±6.4 yıl (SD), çalışmaya katılan hastaların 17 si erkek 16 sı kadın idi. Kontrol gurubunun yaş ortalaması 25.9±5.9 yıl idi. Kontrol olgularının 5'i erkek 5'i kadın idi. Akut konjonktivitlerin gözyaşı kırılma zamanı ortalaması 11.23±6.18 sn, kontrol gurubunun gözyaşı kırılma zamanı ortalaması 23,50±4.45 sn olarak bulundu. $p<0.05$ olduğundan akut konjonktivitli hastalarda gözyaşı kırılma zamanı anlamlı olarak düşük bulundu.

Sonuç: Sonuç olarak bizim çalışmamız da akut konjonktivitin gözyaşı stabilitesinde önemli değişikliklere neden olabildiği saptanmıştır. Akut konjonktivit semptomlarının önemli bir bölümünün kuru göz semptomlarına benzer özellik göstermesinin nedeni akut konjonktivitlerde ortaya çıkan gözyaşı stabilitesi bozukluğu olabilir.

Anahtar Kelimeler: Gözyaşı Kırılma Zamanı; Konjonktivit; Gözyaşı Filmi.

INTRODUCTION

Defined as inflammation of the conjunctiva, conjunctivitises are the most common type among eye diseases. A large part of the factors in conjunctivitises are external but, though rarely, conjunctivitis may also occur due to endogenous reasons. Arising from several factors, the normal appearance of the conjunctiva may get disrupted and, eventually, patients may end up in numerous issues like hyperemia, chemosis, papillary and follicular formations, eye discharge, and the development of membrane and lymphadenopathy (1). Conjunctivitises may be induced by infectious (bacterial, viral, chlamydial etc.) or inflammatory (allergic, hypersensitivity-related etc.) reasons (2). In addition to the clinical appearance of the eye, some diagnostic tests are also helpful in the definitive diagnosis of conjunctivitises. The total lacrimal area is 16cm2 and it covers the conjunctival and corneal surfaces.4-9µ in thickness and with a pH value of 7.25, tears form a filmy layer consisting of three different (lipid, aqueous, and mucin) layers (3). The lipid layer is secreted from the meibomian glands while the mucin layer is secreted from the goblet cells in the conjunctiva; the aqueous layer, however, is formed by the secretion from the Wolfring-and-Krause accessory glands (1). Similar to the case of nonspecific dry eye symptoms, disorders and

irregularities in the tear film layers may result in complaints like burning, foreign body sensation, unexpected tearing, increasing pain towards the end of the day, eyelid fatigue, and sense of fullness (4). Deformation of the tear film layers may be an outcome of a number of rheumatological immune diseases as well as of medication, chemical traumas, and primary diseases and infections in the eye and eyelids (3). Tear film layer breakup time especially points to the lack of mucin layer and is used to assess the stability of tears. The normal value is 15 to 35 seconds and below 10 seconds is considered a pathological case (1,5,6).

With this study, we aim to investigate the effects of acute conjunctivitises on the stability of the tear films.

MATERIAL AND METHODS

We conducted our study on 60 eyes (of 33 patients) with bacterial, chlamydial, or viral acute infective conjunctivitis and seasonal allergic conjunctivitis as the study group (Group 2) and 20 eyes of 10 healthy patients (with similar sexes and ages) who have been admitted to the outpatient clinic for eye examination for spectacles as the control group (Group 2). We also divided Group 1 into two subgroups of different conjunctivitises: 34 eyes of 20 patients with bacterial, chlamydial or viral acute infective conjunctivitis (Group 1-A); and 26 eyes of 13 patients who have been diagnosed with seasonal allergic conjunctivitis (Group 1-B). Because our study does not include invasive procedures, there was no official need to apply for ethics committee approval; still all the procedures of our study have been conducted in accordance with the ethical rules of the Declaration of Helsinki and we obtained written consents from all our patients. Through detailed anamneses, we ensured that none of our patients had any history of dry eyes or contaminant diseases. We recorded the dates of the start of complaints and of the patients' hospital admission. The patients underwent routine ophthalmologic examinations. All patients were clinically diagnosed. After applying Shirmer's test to all the patients, we excluded those with abnormal test results from the study. While selecting our patients, we chose those who have not used any systemic medications like oral antihypertensive drugs, antihistamines, antidepressants etc. that would impair ocular surface and those who have not used chronic topical medications and contact lenses. The selected patients did not have any blepharitis or ocular surface diseases either. More to the point, patients with corneal epithelial defects, and those who show corneal staining with fluorescein were also removed from the scope of our study.

For the tear break-up time test, we did not administer topical anaesthesia. We placed the Haag-Streit fluorescein paper in the lower eyelid fornix to occupy the one-third of the space between the medial and lateral bulbar conjunctiva and waited for the absorption of fluorescein. We asked the patients to blink continuously to allow a homogeneous distribution of the fluorescein. Then, asking the patients to stop blinking, we evaluated the tears with the with cobalt blue filter of the slit lamp. We recorded the time between the last blink and the formation of the first dry area in seconds. The measurements were repeated three times for each patient to secure the average value. Patients with a result below ten seconds were considered pathological cases.

For the statistical analyses, we used SPSS 16 software and paired t test. P value less than 0.05 was considered to be statistically significant.

RESULTS

The mean age of the patients was 28.8 ± 6.4 years (SD). 17 of the patients who participated in the study were males and 16 were females. The mean age of the control group was 25.9 ± 5.9 years. There were 5 male and 5 female patients in the control group. There was not any statistically significantly difference between the two groups (p>0.05). 25 patients were (41.66%) viral conjunctivitis cases while, 5 patients (8.33%) had bacterial conjunctivitis, 4 (6.66%) had chlamydial inclusion conjunctivitis, and 26 patients (43.33%) were seasonal allergic conjunctivitis cases. Half of the viral conjunctivitis patients had symptoms of upper respiratory tract infection. 40% of the viral conjunctivitis patients had lymphadenopathy in front of the ear. None of the patients had any gastrointestinal symptoms. All of the chlamydial inclusion conjunctivitis patients were afflicted by genital symptoms. The patients with bacterial conjunctivitis were given antibiotic drops. Those with chlamydial factors were additionally given systemic antibiotics. We applied topical symptomatic treatment for viral conjunctivitis cases while patients with seasonal allergic conjunctivitis were treated with topical anti-allergic drugs.

The mean tear breakup time in acute conjunctivitis cases was 11.23 ± 6.18 seconds; this value was 23.50 ± 4:45 seconds in the control group (Table). The tear breakup time in patients with acute conjunctivitis was significantly lower (p=0.001; p-value being less than 0.05). The mean tear breakup time in cases with acute infective conjunctivitis was 10.05 ± 6.61 seconds; the same value was 12.76 ± 5.30 seconds in acute seasonal allergic conjunctivitis cases (Table). No statistically significant difference was found between Group 1-A and 1-B (p=0.241). But the difference between Group A and Group 2 was statistically notable (p=0.001). Correspondingly, the difference between Group B and Group 2 was also statistically important (p=0.001).

Table: Analyses of the patients.

Groups	Number of Cases (n)	Tear break-up time (mean±SD)
Group 1	60	11.23±6.18 secs
Group 1-A	34	10.05±6.61 secs
Group 1-B	26	12.76±5.30 secs
Group 2	20	23.50±4.45 secs

DISCUSSION

As one of the tear tests, tear break-up time test is used in the evaluation of mucin and lipid layers (7, 8). In addition to the fact that destruction of mucin and lipid producing tissues has an effect on the test, the direct disruption of mucin and lipid due to several different factors also cause degradation of the stability of tears (2).

Pekel et al. have shown that the results of the tear film break-up time tests on coxsackievirus A24-factor acute hemorrhagic conjunctivitis cases are similar to the measured values of healthy eyes (9). Huang et al. have stated that the tear film break-up time test gives lower results throughout the first month in acute conjunctivitis cases only to return to normal after a month (10).

This idea is supported by the measurements conducted in our study. Because patients with blepharitis excluded from the study, the low tear break-up time in this study makes us think that mucin layer and the conjunctival goblet cells that secrete this layer have been affected. We believe that this kind of conjunctivitis, which may bring damage to the goblet cells, may prepare the infrastructure for dry eye in future periods of life. Khurana et al.'s study have reported normal tear film breakup time and high values of Shirmer's test in acute conjunctivitis cases; they have also presented short tear film breakup time and normal Shirmer's test measurements in chronic conjunctivitis patients (11). It has been found out that dry eye causes impression cytology and a decrease in conjunctival goblet cells (12). Aksünger et al.'s study on inactive trachoma patients has found impression cytology and the number of conjunctival goblet cells to be significantly lower than those of the normal population (13).

Intensively seen in infective conjunctivitis environments, the devastating effects of antimicrobial enzymes and anti-inflammatory mediators on mucin and lipid compositions are likely to change the content and stability tears. Enzymes like lipase, produced by pathogens, also cause the destruction of lipid and mucin (14). Suzuki et al.'s measurements on seasonal allergic conjunctivitis patients show normal values of Shirmer's test, shorter tear film break-up time, and higher-than-normal lipid layer thickness (15). As a result of conjunctival inflammation, reflexive tear secretion is stimulated and aqueous component rate increases. Therefore, we assume that lower amounts of mucin and lipid composition brings about a decrease in tear stability. Lim et al.'s study on cats with conjunctivitis have shown significantly shorter tear break-up time compared to the normal population which has made them conclude that this situation could have paved the way for conjunctivitis or conjunctivitis itself may have caused this situation (16).

Comparing cats with conjunctivitis with healthy cats, Davis et al. have again found significantly accelerated tear film break (17). Doğru et al. have found significant differences in tear breakup time between atopic keratoconjunctivitis patients with notable damage in the epithelium and patients with atopic keratoconjunctivitis without any damage in the epithelium or the normal population (18).

The significantly shorter tear break up time in acute infective and seasonal allergic conjunctivitis patients shows that conjunctival inflammation seriously influences the dynamics of tears though this situation is not specific to the type of inflammation. The studies on post-conjunctivitis impression cytology may reveal further concrete evidences on the damage of goblet cells.

Throughout our study, we have observed that acute conjunctivitis has the potential to cause significant changes in the stability of tears. To have a better understanding of the possible mechanisms of action in the pathogenesis of dry eye syndrome and to strengthen our findings, there is need for more controlled studies that concentrate on impression cytology and the examination of the ocular surface.

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