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Prevalence of dry eye among patients with red eye

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ABSTRACT

Aim: To investigate the dry eye syndrome (DES) among patients with red eye. **Materials and Methods:** This is hospital-based, cross-sectional, case control study. We selected about 100 patients with red eye and 100 patients without red eye (control group) from the same area. A complete eye examination was performed including Schirmer's test and fluorescein staining. **Results:** The study showed that symptoms and signs in the DES patients with red eye is greatly higher than in patients without red eye ($P = 0.001$). The prevalence of dry eye in patients with red eye is 32% and in patients without red eye is 40%. **Conclusion:** Red DES is an advanced stage of DES and it reflects the severity of the DES. Schirmer's test and fluorescein staining are important diagnostic tests for dry eye and hence, they should be included in the routine examination especially in red eye patients.

Key words: Dry eye syndrome, fluorescein stain, precorneal tear film, Schirmer test

INTRODUCTION

Concerning the lacrimal system, the eyes are protected from mechanical insult by two mechanisms, blinking and the tear secretion; by the latter process, irritating particles and fumes are washed away from the sensitive cornea, and the surface of the globe is maintained in a normally moist condition.[1] Blinking maintains the globe moist by spreading the lacrimal secretions over the surface of the eye ball and during sleep by preventing evaporation of tears.

The precorneal tear film consists of three layers. The outermost lipid layer produced by the meibomian glands, the gland of Zeis and Moll,[2] serves to retard evaporation, lubricates the actions of the lids, prevents contamination of the tear film, and thickens and stabilizes the tear film. The middle aqueous layer produced by the main and accessory lacrimal glands makes 90% of the bulk of the tear film. The inner mucin layer produced by goblet cells of the conjunctiva, the cornea is free of goblet cells. It lowers tears surface tension and forms loose adsorptive coating rendering the corneal and conjunctival surfaces wettable.[1-3]

Dry eye is a common disorder of the tear film that results from decreased tear production, excessive tear evaporation, or abnormality in mucin or lipid components of the tear film.[4,5]

Keratoconjunctivitis sicca (KCS) is an ocular surface disorder that develops in aqueous tear-deficiency patients, and it is the most common cause of dry eye. It is seen in patients with primary Sjogren syndrome (autoimmune disease) or with secondary Sjogren syndrome (with connective tissue disease). Symptoms are non-specific and may be mimicked by allergic diseases. Ocular irritation or dry sensation, burning, itching, foreign body sensation, photophobia, and blurred vision are common in patients with dry eye. In KCS, symptoms are worse toward the end of the day. Signs of a dry eye include conjunctival vascular dilation, decreased tear meniscus, irregular corneal surface, decreased tear break-up time, punctate

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epithelial keratopathy, corneal filaments, increased debris in the tear film, positive Schirmer*s test. Symptoms often do not correlate with signs. Dry eye may be complicated by sterile or infectious corneal ulceration. Occasionally, corneal perforation and rarely blindness may occur.[5,6]

KCS may be caused by lacrimal diseases (primary or secondary), xerophthalmia, infiltrative processes (lymphoma, amyloidosis, sarcoidosis), infectious diseases (HIV, trachoma), lacrimal obstructive diseases (ocular cicatricial pemphigoid, and chemical burns), some medications (Anticholinergic medications, timolol eye drops), contact lens wear, diabetes, and aging. Evaporative loss is due to blepharitis-associated obstructive meibomian gland disease, blink disorders, e.g. disorders of eyelid aperture, and eyelid/globe congruity. Dry eye is essentially a clinical diagnosis. No one test is sufficiently specific to permit an absolute diagnosis of dry eye.[7,8]

The tear break-up test (TBUT) is determined by measuring the time lapse between instillation of fluorescein and appearance of the first dry spots on the cornea. Decreased TBUT of less than 10 seconds is considered abnormal, indicative of tear instability. Schirmer's test is done to find out the status of aqueous tear production. It is performed by placing a strip of filter paper in the inferior cul-de-sac; then, the eyes are closed for 5 minutes, and the amount of wetting of the paper strip is measured. Measurement of less than 5 mm is abnormal; 5-10 mm is equivocal. Rose Bengal stains dead, devitalized cells and healthy cells that are protected inadequately by a mucin coating. Fluorescein pools in epithelial erosions and stains exposed basement membrane; it stains the cornea more than the conjunctiva.[5,7,8]

MATERIALS AND METHODS

This is a hospital-based cross-sectional, descriptive, case control study done in Khartoum teaching eye hospital from May 2005 to June 2006.

One hundred patients (200 eyes) above the age of 20 years with red eyes were consecutively selected as the study group. We also selected another group of 100 patients (200 eyes) above 20 years of age and have no red eyes but have other eye complaints. Cases of recent eye trauma were excluded.

Data was collected using a special questionnaire including age, sex, blurring of vision, burning sensation, ocular pain, itching, foreign body sensation, photophobia, any tearing problem, discharge, and diminution of vision. Then we did complete eye examination, with slit lamp for patients in both groups, including Schirmer's-1 test, tear film breakup time (TBUT), and fluorescein staining. Diagnosis of dry eye was reached clinically by symptoms and signs and diagnostic tests (TBUT, Schirmer's test, and Fluorescein stains). Rose Bengal stain was used in a few patients and because it was not available in Sudan we did not continue using it as it is not mandatory in diagnosis of dry eye which is usually diagnosed clinically.

Statistic analysis was done by SPSS system and weighting the data with the age (age-adjusted) for the Pearson chi-square tests (*P*-value), while the odds and the odds ratio were calculated manually.

RESULTS

General characteristic of the groups: The age of the study group ranged 24-70 years with a mean ± standard deviation of 43.6 ± 12.4 years while the ages of the control group ranged 24-80 years with a mean ± standard deviation of 51.3 ± 14.6 years. Because of the sample size, the tested group and the control group were divided according to the age into three groups only, group 1 from 24 to 42 years old and group 2 from 43 to 61 years and group 3 from 62 to 80 years old. The number of males was 44 and the number of the females was 56 patients in the tested group (with red eye) and of the control group was 47 males and 53 females.

Schirmer's test-1 results for the tested group ranged from 1 to 35 mm with a mean ± Std. deviation of 15.1 ± 8.1, while the range of the control group was 3 to 30 mm and with a mean ± Std. deviation of 12.2 ± 6.6 mm [Table 1]. The frequency of the symptoms and signs in the red DES group and non- red DES group are different [Table 2 and Figure 1]. The results of the tests done and used for diagnosis are also different [Table 3].

The number of the red DES patients was 32 and of the non-red DES was 40 patients.

DISCUSSION

As far as we know, no study has been undertaken to explore the difference between the red DES and non-red DES with respect to symptoms and signs in Sudan. From the results above, we can say that the red DES may be an advance stage in the DES because the symptoms and signs are more common in the study group than in the control group except for diminuation of vision and dry eye sensation which are a common finding in normal older people without DES.

Redness in the DES occurs due to vasodilatation which increases wetness of the conjunctiva and decreased

Table 1: Schirmer's strip test -1 results for the age groups in tested and control groups

Samples	Age groups	Schirmer test groups		Total
		Less than 10 mm	10 mm and more	
Tested group	Ages from 24 to 42 years group	23	30	53
	Ages from 43 to 61 years group	6	30	36
	Ages from 62 to 80 years group	3	8	11
	Total	32	68	100
Control group	Ages from 24 to 42 years group	15	18	33
	Ages from 43 to 61 years group	19	25	44
	Ages from 62 to 80 years group	6	17	23
	Total	40	60	100

Table 2: Symptoms in red DES group and non-red DES group of patients

Symptom	Red DES group		Non-red DES group		*P* value	Odds ratio
	No.	%	No.	%		
Burning sensation	24	75	13	32.5	0.001	6.2
Ocular pain	16	50	13	32.5	0.001	2.4
Blurring of vision	16	50	18	45	0.001	1.2
Itching	17	53.1	20	50	0.001	1.1
Photophobia	8	25	5	12.5	0.001	2.3
Foreign body sensation	7	21.9	7	17.5	0.001	1.4
Diminution of vision	20	62.5	34	85	0.001	0.3
Dry eye sensation	8	25	16	40	0.001	0.5

Table 3: Results of tests done and used for diagnosis

Symptom	Red eye group		Non-red eye group	
	No.	%	No.	%
Schirmer test				
<10 mm	32	32	40	40
>10 mm	68	68	60	60
Tear film breakup time				
<10 seconds	15	15	18	18
>10 seconds	85	85	82	82
Fluorescein staining				
Positive	30	30	23	23
Negative	70	70	77	77

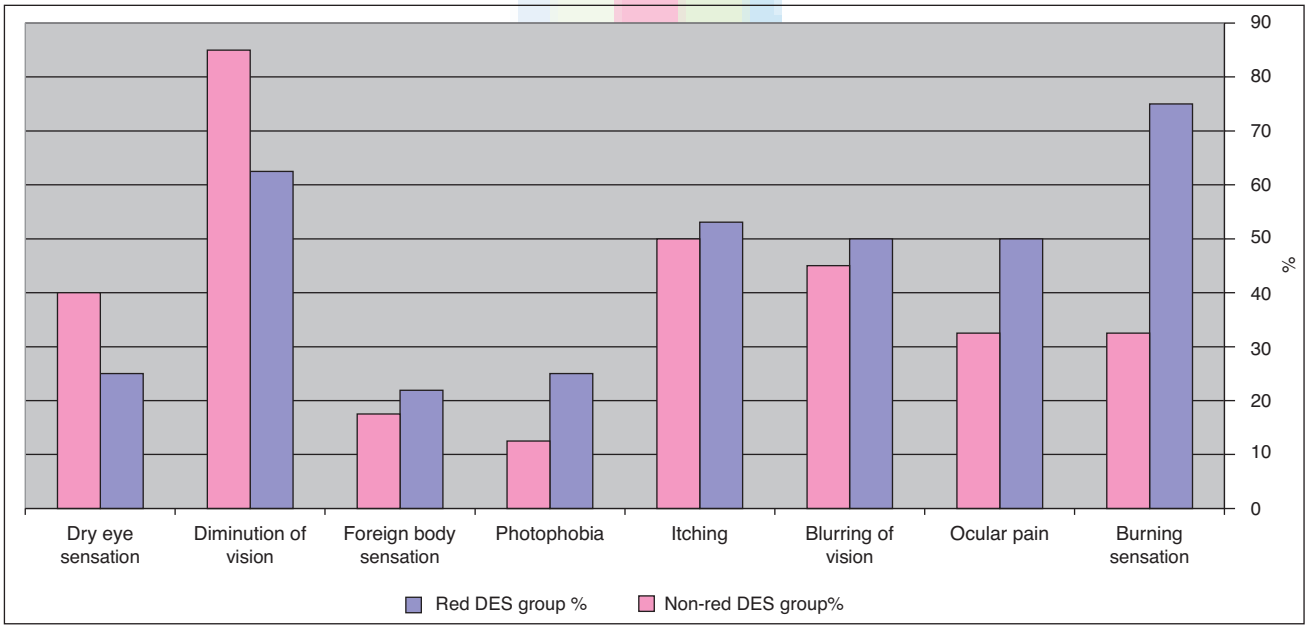

Figure 1: Comparison between the frequency of symptoms and signs in the red DES group and non- red DES group

dryness sensation may be an explanation. DES is associated with a chronic inflammatory state, with the production of autoantibodies, including antinuclear antibody (ANA), rheumatoid factor, inflammatory cytokine release, and focal lymphocytic infiltration (i.e., mainly $CD4^+$ T cells) and proinflammatory neurotransmitters, such as substance P and calcitonin gene-related peptide (CGRP), are released, which recruit and activate local lymphocytes; these factors may play a role in the redness as well as in the other signs and symptoms. However, still we need a lot of studies and researches to say that.

CONCLUSION

1. DES is common in patients with red eyes as well as in those without red eye and it is an important differential diagnosis in any patient with red eye specially if not responding to the routine medications.
2. The symptoms and signs are more common in the red DES patient than the non-red DES which may means red DES is an advanced stage of DES and it reflects the severity of the DES.

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