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Document heading doi: 10.21276/apjhs.2019.6.1.31 **Research Article**

Assessment of the change in the severity of dry eye diseases after prolong reading

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Abstract

Objective: Assessment of the change in the severity of dry eye disease after prolonged reading. Methods: A clinical observational study was done. Ocular surface evaluation of 54 patients with dry eye disease and 16 patients without any ocular symptoms as control was done. **Results:** The mean values in the Dry eye cases and control groups respectively were as follows: OSDI score (34 ±15/7 ± 3); P=0.0039), FTBUT (8 ± 2mm/14 ± 2; P=0.0013), Schirmer's Test score (8 ± 2.5/13 ± 1.5; P=0.0025), corneal staining score (3.8 ± 2.65/0.8 ± 0.25;P=0.0012). Most of the parameters were worsen in dry eye after reading for a mean of 25 ± 2.5 min as follows: FTBUT(2± 1;P=0.0027), Schirmer's Test Score(7 ± 1.5;P=0.037), Corneal Staining Score(5.9 ± 1.48);P= 0.0011) and they were statistically significant. Indices in control group after reading for 22 ± 4.5 min also worsened. (Corneal staining score 1.6 ± 1.2; P=0.0019) **Conclusion:** This study demonstrates a significant impact of prolonged silent reading on the tear film and ocular surface parameters in patients of dry eyes. Everyday tasks, such as reading, exacerbates symptom of dry eye disease (DED).

Keywords: OSDI Ocular Surface Disease Index, TBUT Tear film break up Time.

Introduction

Reduction in quality of life is inevitable due to symptoms of the dry eye. Symptoms are mild in form of transient irritation to dryness, burning, itching, redness, pain, and visual disturbance. Extended Visual tasking like the use of television, computers, iPads, mobile and prolong reading also affect the quality of life.[1] Dry eyes cause neuropathic pain, in addition to affecting the mental health due to anxiety.[2] and may cause sleep disturbances too. A longitudinal study via dry change questionnaire showed ocular surface symptoms, vision-associated symptom and relation to its effect on social function.(e.g. mood instability, inability to socialize, work satisfaction, overall health and family relationship)

Methods and Method

All the family members accompanying the patients were asked for volunteering. Those who were on no ocular medication and did not have a history of a dry eye were asked as the control group.

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The patients, who underwent LASIK or other ocular surgeries in the past 6 months were excluded. Also, patients on the antiglaucoma medication and other ocular medications and systemic antidepressant were excluded.

Tests were performed to confirm dry eye disease. First, OSDI (ocular surface disease index) questionnaire was used and then quantification of patient symptoms was done. The grading was done on a scale of zero to four for the 12 questions. Zero represents that there was no symptom, one represent that symptoms was there some of the time, two represent that symptom were present half of the time, three shows that they are present most of the time and four shows that they were present all of the time. The OSDI is scored on a scale of zero to 100. The Patient with the greater score is more symptomatic and uncomfortable.

Following this, other markers were tested. TBUT (tear film break-up time) test with fluorescein was performed. TBUT measures the tear volume and tear evaporation, and is examined by the first appearance of a dry spot on the cornea after blinking. A reduction in fluorescein intensity was observed as the tear film evaporates reducing the thickness of tear film. In females, normal TBUT is 12.45 second and in males is 14.24. Values of more than 3 secs are considered to be normal.

The recent DEWS2 report suggests that to call a patient DED they should have one of the following findings below: OSDI score ≥13, Tear film break up time (TFBUT) <10, > five corneal staining spots/dots, > nine conjunctival staining dots.

This TFOS DEWS II initiative is very important, because dry eye disease is a global problem, afflicting at least 332 million people worldwide.[3]This is found to be one on the most important cause for visiting of patients to eye care practitioners.

It is very important to differentiate between Aqueous deficiency dry eye or Evaporative dry eye. It is important to measure aqueous production by the test of aqueous function like Schirmers test and also indirect measure like measurement of tear meniscus height. According to DEWS 2 if tear film meniscus height is less than 0.2 mm, it shows an aqueous deficiency.

Then we performed the Schirmer test, and it takes five minutes to perform. The point to be stressed here is that if test of aqueous function is not performed then there is a little way of classifying the patient's dry eye disease.[4] and there is no conclusive way of knowing whether the patient has an aqueous deficiency or evaporative dry eye.

On ocular surface Fluorescien help to find out devitalized cells. The damaged tissues are stained by it. It also stains tissue where cell to cell junction is compromised.

The fluorescein stain was instilled and after 2 minutes with the help of cobalt blue filter corneal staining was evaluated. The ocular surface fluorescein score for the cornea is maximum six for each cornea.[5] The corneal staining score is maximum 3 points, and corneal modifier scores (1 point each for central staining, confluent staining, and presence of filaments).

Now a task of reading was given for 30 minutes in order to stress ocular surface. The test was performed in a properly illuminated room at normal reading distance. All patients used prescribed glasses for BCVA for near. After the reading was over all the homeostatic markers were repeated in the same order done previously as follows TBUT, Tear film meniscus, Schirmers and corneal staining tests.

All measurements were taken from the left eye and analysis was done. Values of p <0.05 were significant.

Result

A *t*- test was used to compare the continuous variables. A paired *t*- test was used to compare before and after observations within the study groups.Table1. The baseline TBUT was significantly different between the dry eye and control patient. A Strong correlation was found between baseline OSCI scores and TBUT values. This shows that instability of the tear film is a major cause of underlying dry eye.

In the dry eye, group mean duration of reading was 25 minutes (20-26minutes; standard deviation 2.5) and in the control group, it is 22minutes (20.1-25 minutes; standard deviation 4.5)(P=0.2).

Table1: Comparision of Baseline parameters and symptom score in Dry eye disease and control group

Variable	Dry eye	Control	P values
Age	56(3.4)	52(6.7)	0.05
Male%	18(30%)	5(32%)	0.55
Females%	36(66.66%)	11(68.75%)	0.42
Duration of reading	25(2.5)	22(4.5)	0.2
OSDI total score 0-100	34(15)	7(3)	0.0039
Ocular symptoms	28	5	0.004
Visual symptoms	32	3	0.0085
Environmental affects	36	6	0.0056
TBUT	8(2)	14(2)	0.0013
Schirmers	8(2.5)	13(1.5)	0.0025
Total Corneal staining 0-6	3.8(2.65)	0.8(0.25)	0.0012
Corneal staining score0-3	1.1	0.8	0.001
Central corneal staining n (%)	14(25.9)	0	0.005
Confluent corneal staining n (%)	9(16.66)	0	0.0052
Filaments n (%)	1(0.18%)	0	0.005

Reduction in all clinical dry eye measurements was seen after prolonged reading in dry eye and was statistically significant. In addition, reading also significantly affected total corneal staining in the control group. The indices in dry eye after reading for a mean of 25 ± 2.5 min in comparision to baseline were as follows: FTBUT(2 ± 1;P=0.0027), Schirmer's Test Score(7 ± 1.5;P=0.037), Corneal Staining Score(5.9 ± 1.48);P= 0.0011).These values were statistically significant.

Table 2: Comparision of homeostatic markers at baseline and after prolonged reading in Dry eye disease and control groups

	Dry Eye	**N=54**		**Control**	**N=16**	
Variable	**Baseline**	**After reading**	**P values**	**Baseline**	**After reading**	**P value**
TUBT,sec	8(2)	2(1)	0.0027	14(2)	13	0.12
Schirmers Test	8(2.5)	7	0.037	13(1.5)	12.8	0.52
Total Corneal Staining 0-6	3.8(2.65)	5.9(1.48)	0.0011	0.8(.25)	1.6(1.2)	0.0019
Corneal Staining score,0-3	1.1	2.8	0.0015	0.8	1	0.0012
Central Corneal Staining present ,n (%)	14	29	0.0011	0	3	0.0019
Confluent Corneal Staining present,n (%)	9	16	0.0014	0	3	0.0018
Filaments present,n (%)	1	1		0	0	

Discussion

Dry Eye can develop because of excessive evaporation of tears or because of reduced supply of tears. The Dry eye is a chronic condition and the sufferers have difficulty in using the computer, reading and watching television.[6] Quality of life is affected by the dry eye, and patients have more depression and anxiety.[7-11] Environmental risk factors are due to low humidity e.g. air conditioner and exposure to dust, wind, and Sun. Other factors, smoking, driving, and certain occupation also cause a great impact. The rate of the dry eye is more in tropical developing nations. The condition can't be cured, but reducing environmental ocular stress can relieve symptoms and improve quality of life. It was also observed that patients with Dry eye diseases, have slow reading rates because natural tears fail to adequately lubricate eyes. Women are affected more as compared to men.[12]

Results demonstrated from the observation shows that reading causes changes in both the dry eye and normal control. A good correlation was seen in patient-reported symptoms and dry eye parameters measured by the physician at the baseline. Similarly, a correlation was seen in patient symptoms measured on OSCI at the baseline and parameters like tear film meniscus, TBUT, corneal staining after prolong the reading task. There was worsening in corneal staining after prolonged reading. One of the limitation of study was conjunctival lissamine test was not done due to the difficulty to assess this dye.

Another objective of our study was to use an inexpensive tool like reading to compare the baseline homeostatic index in a patient with the dry eye with those who were stressed with prolong reading. Many controlled environmental chambers have developed and many studies are done with it to find the effect of humidity, wind, the sun on the dry eye however, these tools are expensive.

Conclusion

The patients report a lot of symptoms when they visit a practitioner, which are not easily picked up by tear film

evaluation at rest and ocular staining. By performing ocular stress due to prolong reading it helps to correlate better with presenting symptoms.

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