Original Research Article

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Evaluation of dry eye in computer users

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ABSTRACT

Background: Increased use of computers led to an increase in the number of patients complaining about ocular and non-ocular symptoms related to computer use. One of such computer associated ill-effect is, "Computer Vision Syndrome" manifesting as dry eye. This study was done to find out prevalence of dry eye.

Methods: Computer users were grouped in Group A > 2hours to \leq 4 hours, Group B > 4 hours to \leq 6 hours, Group C > 6 hours to \leq 8 hours according to their exposure to computer per day. Dry eye evaluation was done with ocular surface disease index questionnaire, tear meniscus height, and tear film brake up time, schirmer test. One way analysis of variance test was used to compare mean values, find p values and ensuring statistical significance.

Results: In our study prevalence among the males and females was found to be of 25%. The prevalence of dry eye among 20 to 30 and 31 to 40 years of age is 13.04% and 51.64 % suggesting that the prevalence of dry eye increases as the years of computer exposure increases. The overall prevalence of dry eye in computer users was found to be 25% with prevalence of 9.3%, 18.18% and 45.71% in groups A, B and C respectively.

Conclusions: It seems prevalence of dry eye is increasing with increase in duration of computer use per day. OSDI together with TBUT, schirmer-1 test cab be performed easily and used to support diagnosis of dry eye.

Keywords: Computer users, Dry eye, Ocular surface disease index questionnaire, Tear meniscus height, Tear film brake up time, Schirmer test

INTRODUCTION

Dry eye occurs when people don't have either enough tears, or the correct composition of tears, on the surface of their eyes to lubricate the eyes and keep them comfortable. It is a very common condition affecting a significant percentage of the population, surveys have estimated the prevalence of dry eye varying between 5% and >30% in various age groups across different countries and worldwide. The estimated number of people affected by dry eye ranges from 25 to 30 million all over the world.\(^1\) There is no doubt that in recent years, dry eye disease has become a common

presentation in ophthalmologist outpatient department and is presenting with varying degrees of ocular discomfort and disability. Dry eye's prevalence is more in elderly people, certain high risk groups like farmers, computer users, in environmental exposures such as reduced humidity and increased Wind.²

Staring at a computer monitor or digital displays for hours on end has become a part of the modern workday. And inevitably, all of that staring can put a real strain on your eyes.³ Many such individuals then experience decreased ability to perform certain activities such as reading, driving, and computer related works, which

require visual attention. Patients experience dry eyes symptoms constantly and severely, affecting their quality of life.⁴

In recent years there has been increased in computer and digital display users in India so the study is necessary with an objective to measure the prevalence of dry eye in computer user and estimate their severity profile with increasing number of computer usage hours per day. The relationship between computer usages per day with dry eye can be observed and so at the end of the study we will be able to create an awareness about regular screening and early intervention of dry eye in computer users whose number is increasing exponentially in recent years.

METHODS

Method of the collection of data

Data was collected after approval from Institutional Review Board (IRB), Government Medical College.

Study design

It is a hospital based, cross sectional, non-invasive and prevalence study.

Study area

Department Of Ophthalmology and Government Medical College.

Sample size

Total 100 computer users presenting to outpatient department of ophthalmology in Sir T Hospital Bhavnagar. Sample size of 100 is taken using Daniels formula for sample size of 95% of confidence interval.

Study period

Study will be carried out over a period of 10 months (October 2015- July 2016).

Statistical analysis

The data will be tabulated in Microsoft excel 2010 software and analysed using Graph pad Instat.(trail version) Data will be analysed for prevalence of dry eye in computer users. Statistical tests use is one way analysis of variance (ANOVA) test. A P-value will be calculated and value of less than 0.05 will be considered significant.

Inclusion criteria

- Both male and female patients
- Between the age of 20 to 40 years of age

- Computer users using computer for more than 2 hours per day at least since 1 year.
- Willing to give prior consent for evaluation.

Exclusion criteria

- Patients with history of allergic conjunctivitis, gross lid abnormalities, life threatening systemic disease, acute ocular infections, extra and intra ocular surgery within last 6 months.
- Patients taking systemic medication known to cause dry eyes like antihistaminic, anticholinergic etc.
- Contact lens users

Patients will be classified in following groups as per hours of computer usage per day Group A > 2hours to \leq 4 hours per day, Group B >4 hours to \leq 6 hours per day, Group C >6 hours to \leq 8 hours per day and after that they are subject to dry eye evaluation.

Ocular surface disease index questionnaire (OSDI)

The instrument, introduced in 1997 by the outcomes research group (Allergan Inc., Irvine, CA), consists of 12 items that assess symptoms, functional limitations, and environmental factors related to dry eye. Each item has the same five-category Likert-type response option, and each of the three subscales has its own question type. The total OSDI score was then calculated on the basis of the following formula: OSDI = [(sum of scores for all questions answered) \times 100] / [(total number of questions answered) \times 4].

Higher score representing the greater disability. The index demonstrates sensitivity and specificity in distinguishing between normal subjects and patients with dry eye. The OSDI is a valid and reliable instrument for measuring the severity of dry eye disease, and it possesses the necessary psychometric properties to be used as an end point in clinical trials. ⁵⁻⁶

OSDI scores are used for measuring severity of dry eye.⁷ DEWS report of 2007 accepted OSDI questionnaire as symptoms and quality of life instrument for evaluation of dry eye.⁸ However, The ODISSEY European Consensus Group acknowledged that symptom assessments may not be easily reproducible, are not necessarily specific for DED, and their use may carry a risk of overtreatment. Nevertheless, it is generally accepted that an OSDI score of around 30 or over is necessary for diagnosis of severe DED.⁹

Tear meniscus height (TMH)

Tear meniscus height (TMH) was measured at the midsection along the lower eyelid directly below the centre of the pupil. The distance between the upper edge of the lower eyelid and the visible junction between the cornea and the lower tear meniscus was acknowledged as

the lower TMH. Keeping the magnification of slit lamp same throughout the study inspection of the tear meniscus between the globe and the lower eyelid (normally 1.0 mm in height and convex) is essential. A tear meniscus 0.35 mm or less is considered abnormal.¹⁰

Tear film break-up time (TFBUT)

The tear film break-up time is defined as the interval between the last complete blink and the first appearance of a dry spot, or disruption in the tear film. A tear breakup time of, less than 10 seconds was considered consistent with dry eye. 11 The mean TBUT scores of the right and left eyes were used for the statistical analysis

Schirmer-1 test

Schirmer I test (without anaesthesia) was performed to evaluate basal and reflex tear secretion. In the Schirmer I test, a filter paper strip (35×5 mm) was used to measure the amount of tears produced over 5 minutes. Wetting <5 mm was considered consistent with dry eye. ¹¹

RESULTS

Study was done in 100 computer users among which 52 are males and 48 are females. Mean age of all subjects in the study is 27.29 year. In our study there are 69 Computer users from age group 20 to 30 year and 31 Computer users from age group 31 to 40 year.

In our study the mean ocular surface disease index score was 26.59, 27.99 and 38.86 in group A, B and C respectively (Figure 3). When we compare the p values of mean OSDI score of different groups, we found it to be extremely significant p<0.001 in compare group B versus C and A versus C. When the OSDI Score cut off value is set at ≥30 the prevalence of dry eye is 34.3%, 33.33%, 74.28% in group A, B, C respectively over all prevalence is 48% (Figure 1).

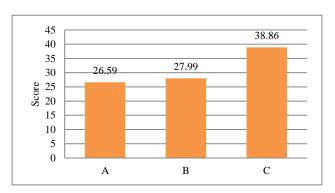


Figure 1: Mean OSDI score.

The mean tear meniscus height in right eye around 0.718, 0.69, 0.494 and in left eye around 0.721, 0.693, 0.497 in group A, B, and C respectively (Figure 2) and while compering the p values of mean values, found it to be

extremely significant p<0.001 in compare group B versus C and A versus C.

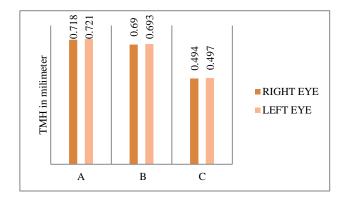


Figure 2: Mean tear meniscus height in millimetre.

When we analysed results of the tear film brake up time, the mean tear film brake up time in right eye around 20.563, 16.152, 11.514 and in left eye around 20.250, 16.667, 12.60 in group A, B, and C respectively (Figure 3) and the p values of mean values, we found it to be significant in all compare groups after considering time of less than 10 sec is diagnostic for dry eye in computer users.

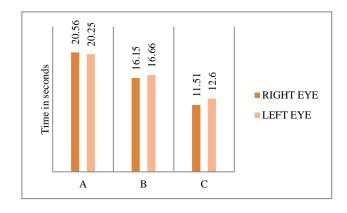


Figure 3: Mean tear film brake up time in study groups.

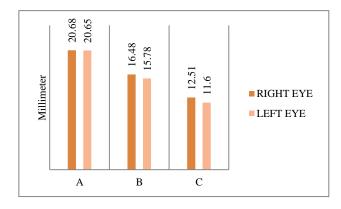


Figure 4: Mean Schirmer - 1 test values in study groups.

Similarly when we analysed our findings of schirmer-1 test in our different study groups we got mean schirmer-1 values in right eye around 20.688, 16.485, 12.514 and in left eye around 20.656, 15.788, 11.6 in group A, B, and C respectively (Figure 4) and the p values of mean values, we found it to be significant in all compare groups after considering time of less than 5 mm/5min is diagnostic for dry eye in computer users.

DISCUSSION

Various studies conducted in different location of India found various prevalence rates in high exposure occupational groups such as computer users, drivers etc. are Choudhary P et al = 12.3 %, Sahai A et al = 20.7%, Shah S et al = 58.6% and in another study by Ranjan R et al for Prevalence of Dry Eye and Its Association with Various Risk Factors 61.54%. 12-14 Hagan S et al specifically conducted a study of 112 noncontact lens using computer operators found that 68% men and 73% women reported symptoms of dry eye. 15

So after considering above studies it can be said that the prevalence of dry eye in high risk groups such as computer users ranges from 20 % to 73%. In our study prevalence among the males and females was found to be of 25% in both. The prevalence of dry eye among 20 to 30 and 31 to 40 years of age is 13.04% and 51.64 % suggesting that the prevalence of dry eye increases as the years of computer exposure increases. The overall prevalence of dry eye in computer users was found to be 25 % with prevalence of 9.3%, 18.18% and 45.71% in groups A, B and C respectively (Table 1) indicating the prevalence of dry is positively correlated to the hours of computer usage per day.

Table 1: Subjects with dry eye in study groups.

Group	Sample	Dry eye	Percentage
A	32	3	9.2%
В	33	6	18.18%
C	35	16	45.71%
Total	100	25	25%

The blink rate while working on the computer has been reported to be significantly less than the normal which leads to poor tear film quality. Tsubota K had shown that the mean blink rate significantly drops down as level of concentration or attention increases. Mean blink rate is 22 per min in relaxed state to 10 per min when reading a book and 7 per min on the computers. ¹⁶ As a preventive measure Bilton has proposed a simple term '1, 2, 10' (one to ten) to describe the commonly used distances for the current electronic forms of written communication. Mobile phones at a distance of one foot (about 30 cm), two feet (about 60 cm) to two and a half feet for desktop devices and laptops, and 10 feet (about 3 meters) for the television screens.¹⁷ Use the computer monitor in an ergonomic position - one arm distance or 40 inches away with a downward gaze of 14° or more appears to help

relieve the symptoms of computer related dry eye. This is achieved by placing the monitor so that the top line of screen is at or below eye level. Avoid screen reflections, glare from window, or overhead lights. Dust can affect clarity of screen and cause glare, so all monitors or screens should be free of dust. Avoid turning the air conditioning too high or direct draughts to the face.

Due to the interrelated nature of the tear film components, no single clinical test is sufficiently sensitive or specific to diagnose dry eye and predict the most accurate management strategy. We have studied subjective symptoms using a pre validated questionnaire like OSDI questionnaire and objective tests of tear film quality, and quantity to make a diagnosis of dry eye syndrome. We also found the good association between the subjective symptoms questionnaire and objective test for tear film. It seems that the prevalence of dry eye is increasing in the era of the Internet. Thus, as ophthalmologists will probably encounter an increasing number of dry-eye patients in their daily practice, they should be familiar with quick, reliable, and less invasive diagnostic tests to manage the disease successfully.

CONCLUSION

There is significant increase in symptoms severity with increase in duration of computer use per day. The OSDI questionnaire can be used easily used at work station also as it can be safely regarded as tool to early recognition of dry eye and seek the ophthalmologist help for early diagnosis and intervention. The OSDI together with the TBUT, schirmer-1 test can be performed easily and used to support the diagnosis of dry eye which will help in prevent the loss of work productivity and vision related quality of life in computer users.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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