



## PREVALENCE OF DRY EYE DISEASE IN COMPUTER USERS

## Ophthalmology

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## ABSTRACT

**Purpose:** Computer users complain of eye irritation due to decreased blink rate and changes in tear film. Therefore purpose of this study was to know the prevalence of dry eye in computer users. **Materials and Methods:** A prospective study was done in 160 eyes of 80 clerical staff working on computer for more than 4 hours/day in a medical college. A detailed ocular examination with assessment of dry eye was done with TFUBT, SCHIRMER'S test, tear meniscus height and a questionnaire about dry eye. **Results:** The prevalence of dry eye among computer users of this group was found to be 32.5%. **Conclusion:** Prevalence of dry eye is increasing in computer users.

## KEYWORDS

## INTRODUCTION

The discovery of computers has revolutionised most professions and their work performance up to great extent. Now a days computers, smart phones and other digital devices are being commonly used both in the workplace, home and during leisure time. Computer vision syndrome (CVS) is a new health related condition that adversely affects workers. Recent studies have shown that use of technology is associated with several health related issues such as visual, musculoskeletal and neural ailments which health care provider of today has to deal with.<sup>1</sup>

Normally tears are consist of 3 layers. The Outer one is lipid layer which prevents evaporation. About 90% of the tear volume is formed by water which has a low concentration of salt and it constitutes the middle layer. The innermost layer is mucin layer which adheres tear film with epithelium. Working on monitors for long hours leads to quick evaporation from the surface either due to decreased blinking reflex or change in composition of tear film like deficiency of mucin that leads to unstable tear film.

Dry eye disease (DED) is a chronic ocular pathology and a major global health problem that manifests with a plethora of symptoms such as burning, photophobia, tearing, and grittiness. People with DED experiences difficulties in daily routine activities affecting their quality of life.<sup>2,4</sup>

At the 2007 International Dry Eye Workshop, the definition of the disease was reviewed and rephrased as follows: "Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tears film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface".<sup>5,6</sup> Prevalence of dry eye disease ranges from 5% to 35% and is greatly influenced by geographic location and climatic conditions.<sup>7,8,9</sup>

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. Computer vision syndrome is a leading occupational hazard of 21 century and its symptoms affect nearly about 70% of all computer users.<sup>10</sup> Nearly about 60 million people suffer from CVS with one million new cases occurring each year.<sup>11</sup>

In recent years, dry eye disease has become a common presentation in ophthalmologist outpatient department.

Dry eye's prevalence is more seen in elderly people, certain high risk groups like farmers, computer users, in environmental exposures such as reduced humidity and increased Wind.<sup>12</sup> Staring at a computer monitor or digital displays for hours has become a part of the modern workday. And inevitably, all of that staring can put a real strain on eyes.<sup>13</sup> Many such individuals then experience decreased ability to perform certain activities such as reading, driving, and computer related works, which require visual attention. Subjects experience dry

eyes symptoms constantly and severely, affecting their quality of life.<sup>14</sup>

## 2 MATERIALAND METHODS

The study was conducted at GMC RAJOURI. Subjects presenting to the outdoor patient department over a period of 1 year (June 2021–May 2022) were evaluated. Ethical clearance was obtained from the Review Board. Informed consent was obtained, and the study adhered to the tenets of the Declaration of Helsinki.

## 2.1.inclusion Criteria

1. Both male and female subjects.
2. Between the age of 20 to 40 years of age
3. Computer users using computer for more than 2 hours per day at least since 1 year.
4. Willing to give prior consent for evaluation.

## 2.2.Exclusion criteria

1. Subjects with history of allergic conjunctivitis, gross lid abnormalities, life threatening systemic disease, acute ocular infections, extra and intra ocular surgery within last 6 months..
2. Subjects taking systemic medication known to cause dry eyes like antihistaminic, anti-cholinergic etc.
3. Subjects on anti-glaucoma, topical steroids
4. Contact lens users
5. Diabetics etc

Study was conducted on 80 clerical staff of the college and they were classified in following groups as per hours of computer usage per day.

Group A: 4 hours to ≤6 hours per day

Group B: 6 hours to ≤8 hours per day

Group C: > 8 hours per day

And they were evaluated for dry eye using OSDI questionnaire, Schirmer's test, Tear film break up time (TFBUT) and tear meniscus height (TMH) following slit lamp examination and their visual acuity.

## 2.3. 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 indistinguishing 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.<sup>15,16</sup>

### 2.4. 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.<sup>17</sup>

### 2.5. 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.<sup>18</sup>

### 2.6. Schirmer Test

Schirmer 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.<sup>18</sup>

## 3. RESULTS

A total of 80 clerical staff were examined of which 16 subjects [20%] were from group A (works for 4-6 hours per day), 40 subjects [50%] were from group B (works for 6-8 hours per day) and 24 subjects [30%] were from group C (working for > 8 hours per day) as shown in Table 1

**Table 1: Divisions based on working hours per day**

Group	Working hours	Subjects
A.	4-6 Hours/Day	16
B	6-8Hours/Day	40
C.	> 8 Hours/Day	24
Total		80

These subjects were evaluated for tests for dry eye as shown in Table 2. 26 out of 80 subjects (32.5%) were found to have dry eye. Among those 26 cases, maximum no of persons (15 out of 26, 57.6%) showed positive results with OSDI questionnaire. 5 out of 26 persons (19.23%) had dry eye with Schirmer's test. 4 out of 26 persons had TFBUT value <10 sec. And only 2 person had dry eye with tear meniscus height.

**Table 2: Tests performed**

Tests	No. of Pt's Showing Positive Test	percentage
OSDI Questionnaire	15/80	18.75%
Schirmer's Test	5/80	6.25%
TFBUT	4/80	5%
Tear meniscus height	2/80	2.5%
Total	26/80	32.5%

Prevalence of dry eye among computer users was found to be more in group C which includes subjects working on computer screens for > 8 hours per day than in group B and group A as shown in Table 3.

**Table 3: Result**

Group eye	Cases with dry (out of 26 cases)	% of dry
A (4-6 H/D)	4	15.38%
B (6-8 H/D)	6	23.07%
C (> 8 H/D)	16	61.53

## 4. DISCUSSION

Various studies conducted in different parts of India found various prevalence rates of dry eye among computer users. 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%.<sup>4,19-21</sup> 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.<sup>22</sup>

In a study by Titiyal et.al, based on OSDI questionnaire prevalence of dry eye was reported to be 32%.<sup>23</sup> In our study also we found significant

results with OSDI Questionnaire.<sup>2</sup> According to a study conducted by Aurora Gajta et al, subjective symptoms, like ocular discomfort appears in more than 80%, the alteration of the tear film occurs in more than 60% among computer users.<sup>5</sup>

DED is one of the most prevalent ophthalmic disorders and may have an adverse impact on the quality of life. In addition to causing various disabling symptoms, it may also compromise the results of the corneal, cataract, and refractive surgical procedures. The prevalence of DED in India is higher than the global prevalence and ranges from 18.4% to 54.3%.<sup>20,23</sup>

Desk job with computer use was significantly associated with the risk of developing severe DED. The low relative humidity in indoor office environment and air conditioned rooms negatively impacts the tear film by causing desiccation of the eye. Use of computer for more than 8 h a day has been reported as a significant risk factor for DED, mainly attributed to the decrease in blink rate while using these devices, thereby hampering the uniform distribution of the tear film over the ocular surface.<sup>13</sup> 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.<sup>24</sup> Since the main route of tear elimination is through evaporation, longer periods of eye opening and the higher gaze angle when viewing a computer screen results in faster tear loss which further worsens the dry eye.

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.<sup>25</sup>

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.

## 5. CONCLUSION

We observed prevalence of dry eye among computer users (clerical staff of our institute) is 32.5%. It was found to be related with no of working hours. Increasing use of computers, laptops, tablets, smart phones and television has led to an increase in the prevalence of DED in the younger population hence further epidemiological studies are required to accurately estimate the prevalence, its relation with duration of hours spent on computer screens and its preventive measures and awareness.

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