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DRY-EYE DISEASE AMONG MEDICAL PROFESSIONALS IN A TERTIARY CARE HOSPITAL IN WESTERN UP DURING THE LOCKDOWN PERIOD 2020 – A CROSS-SECTIONAL STUDY.

Ophthalmology

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ABSTRACT

Objective: To estimate the prevalence of dry-eye disease (DED) among medical professionals in a tertiary care hospital in Western UP during the lockdown period 2020.

Materials & Methods : This was a cross-sectional hospital-based, observational study from 7th May 2020 till 14th May 2020, that included 50 medical professionals as subjects. The study compares the increase in the number of hours spent on Visual Display Terminals (VDTs) before and during the lockdown period 2020. This in-turn led to numerous ill-effects on human beings, out of which ocular manifestations like dry-eye disease has been on the rise. The study has been carried out in the form of questionnaire survey data – Ocular Surface Disease Index (OSDI) asking about the symptoms and various other parameters, related to dry eye.

Results: The mean number of hours spent on VDTs before lockdown was 2.82±1.32 hours and during lockdown was 6.26±4.76 hours. In accordance with the OSDI scoring, 23/50 subjects developed DED. Out of these, 28% (14/50) had mild DED, 16% (8/50) had moderate DED, and only 2% (1/50) had severe DED. Prevalence of dry eye was directly proportionate to exposure time to VDT during the lockdown.

Conclusion: The prevalence of dry-eye disease (DED) among medical professionals during the lockdown period 2020 was 46%. This was attributed to the increased dependence on VDTs for various purposes.

KEYWORDS

Dry-eye disease, Visual display terminals, Ocular surface disease index, Lockdown

INTRODUCTION

"Dry eye is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles." [1]

The World Health Organization (WHO) on March 11, 2020, had declared the novel coronavirus (COVID-19) outbreak a global pandemic. [2] On 24 March 2020, the Government of India under Prime Minister ordered a nationwide lockdown for 21 days, limiting movement of the entire 1.3 billion population of India as a preventive measure against the COVID-19 pandemic in India. [3] Suiting to the current scenarios, the lockdown was further extended till the 31st of May, 2020.

With almost over 2 months of lockdown, people have been staying indoors with negligible outdoor activities. Keeping up with present day advanced technology, laptops, television and smart-phones have not only been the major source of entertainment for people from all age-groups but also a medium of being connected to their loved ones during such desperate times. They also have been the platform for attending meetings, getting office work done and students attending online classes. So much so, that the word 'seminar' has been replaced by the word 'webinar'.

But as every coin has its flip side, this increased screen time played an important role in the development of evaporative type of dry-eye disease. Use of computers and display devices with a screen decreases the number of eye blinks, leading to incomplete blinking, evaporation of tears, and subsequently to dry eye disease.[4] The most frequent symptoms are gritty eyes, sore eyes, increased sensitivity of eyes to light associated with blurry vision. Symptoms leading to functional restrictions while reading, driving at night, working over laptops or while watching television.

The purpose of this study is to subjectively establish the role of increased screen hours during the lockdown period, in medical professionals in the development of dry-eye disease.

MATERIALS AND METHODS

This cross-sectional study was conducted by the Department of Ophthalmology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, India during the 2020 lockdown period. The study period was from 7th May 2020 till 14th May 2020. The study design was approved by the Human Ethical Committee of SRMS-IMS.

A total of 50 junior doctors verbally consenting, after being explained the purpose were enrolled for the study.

Inclusion Criteria :

1.Doctors posted in the non-COVID areas of the hospital.
2.Subjects between the age 20 and 30 years.
3.Minimum exposure of 1 hour on any type of VDT.

Exclusion Criteria :

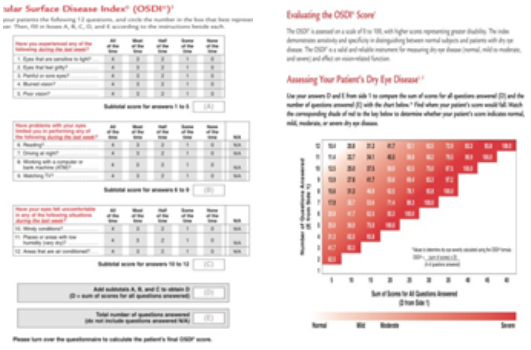
1. Contact lens users.
2. Patients on any topical treatment for glaucoma or any other eye condition.
3. Patients suffering from ocular inflammatory conditions like conjunctivitis, scleritis, uveitis, glaucoma, stye and blepharitis.
4. Patients on some systemic medications (beta blockers, thiazides, decongestants, antihistamines, OCPS, antidepressants, NSAIDs, isotretinoin) known to cause dry-eye disease.
5. Patients suffering from some systemic disorders associated with dry-eye disease (Sjögren's syndrome, rheumatoid arthritis and systemic lupus erythematosus, diabetes).
6. Patients with any previous history of ocular surgery such as cataract, glaucoma or refractive surgery.
7. History of any previous ocular trauma.
8. History of visit to the ophthalmology OPD for any other complaints other than refractive error.

A questionnaire survery study data regarding the symptoms of dry eye disease along with questions regarding the duration of screen time (hours per day) before and during the lockdown, purpose of using

VDTs, previous history of any dry-eye disease, previous use of any lubricating eyedrops, alteration in sleep hours in accordance to the duty hours was conducted.

A standardized dry eye syndrome questionnaire, namely the Ocular Surface Disease Index (OSDI) was used. The OSDI, which was created by the Outcomes Research Group at Allergan Inc in order to quickly assess the symptoms of ocular irritation in dry eye disease and how they affect functioning related to vision.[5] The OSDI has demonstrated good specificity (0.83) and a moderate sensitivity (0.60) when distinguishing between patients with dry eye disease and normal subjects.[5]

This 12-item questionnaire assesses dry eye symptoms and the effects it has on vision-related function in the past week of the patient's life.[6] The questionnaire has 3 subscales: ocular symptoms, vision-related function, and environmental triggers. Patients rate their responses on a 0 to 4 scale with 0 corresponding to "none of the time" and 4 corresponding to "all of the time." The final score was calculated by multiplying the sum of all the scores by 25 and then dividing the total by the number of questions answered. The final score calculated ranges from 0 to 100 with scores 0 to 12 representing normal, 13 to 22 representing mild dry eye disease, 23 to 32 representing moderate dry eye disease, and greater than 33 representing severe dry eye disease.[7]



OSDI questionnaire

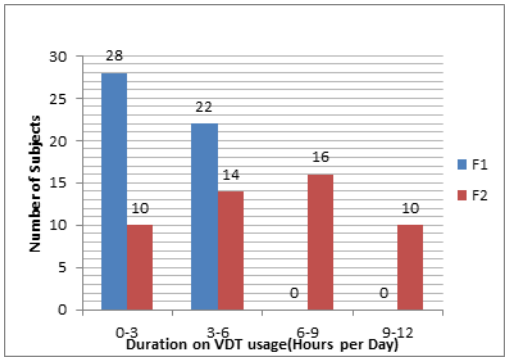
RESULTS

A total of 55 questionnaires were distributed, out of which 5 subjects were excluded from the study. There was history of contact lens usage in 2 subjects, history of topical lubricant usage in 2 subjects and 1 subject had an episode of acute conjunctivitis.

Out of the 50 subjects enrolled, 28 were females (56%) and 22 were males (44%). All the subjects were within the age-group of 20-30 years with the mean age of 25.42 years.

Table 1: Number Of Hours Spent On VDTs Before And During Lockdown.

Duration of VDT usage (h/day)	Before lockdown	During lockdown
0-3 h	28	10
3-6 h	22	14
7-9 h	0	16
10-12 h	0	10



Graph 1: Graphical representation of pattern of spending hours on VDTs before and during lockdown.

The average hours spent on VDTs before and during the lockdown were analysed and it showed that, the mean number of hours spent on VDTs before lockdown was 2.82±1.32 hours and during lockdown was 6.26±4.76 hours. (Table 1) (Graph 1)

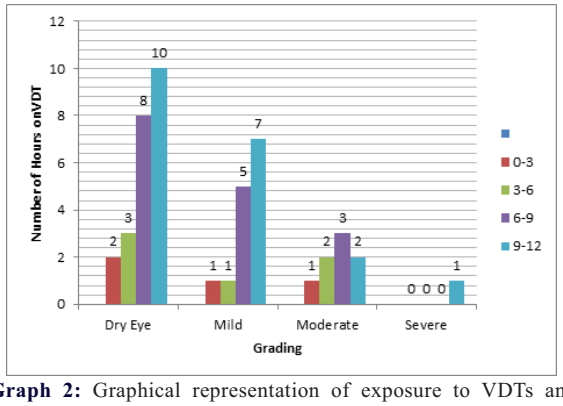
Table 2 : Grading Of DED According To OSDI Scoring

Grading of DED according to OSDI	Number of subjects
Normal (0-12)	27
Mild DED (13-22)	14
Moderate DED (23-32)	8
Severe DED (>33)	1

In accordance with the OSDI scoring, DED was detected in 46% (23/50) of the subjects. Out of these, 28% (14/50) had mild DED, 16% (8/50) had moderate DED, and only 2% (1/50) had severe DED.(Table 2)

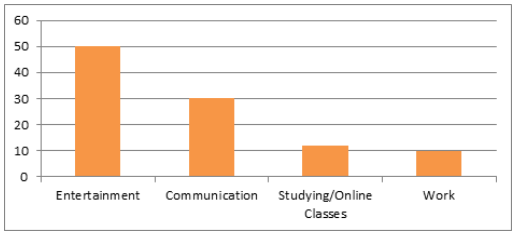
Table 3 : Incidence Of Dry Eye Was Detected Which Was Directly Proportionate To Exposure Time On VDT During The Lockdown

Duration of Exposure To VDTs during lockdown	No. of Subjects	Dry Eye Disease	Mild	Moderate	Severe
0-3 h	10	2 (8.69%)	1	1	0
3-6 h	14	3 (13.04%)	1	2	0
6-9 h	16	8 (34.78%)	5	3	0
9-12 h	10	10 (43.47%)	7	2	1
		23	14	8	1



Graph 2: Graphical representation of exposure to VDTs and development of dry-eye disease.

Out of the 10 subjects spending up to 3 hours over VDTs, 2 developed DED. Only 3, out of the 14 subjects with screen time of 3-6 hours had DED. 5 had mild DED and 3 had moderate DED according to OSDI, spending 6-9 hours on screens. All of the 10 subjects, investing 9-12 hours over VDTS had DED and 1 was reported to have severe grade DED. (Table 3) (Graph 2)



Graph3 : Purpose Of Using Any Of The VDTs.

Entertainment came across as the most common purpose, followed by communication via video calling with friends and family. Almost 12 subjects, claimed to have been using screens for attending webinars and online classes and up to 10 subjects claimed to use it for thesis work. (Graph 3)

Out of the 50 subjects, only 2 had experienced dry eye symptoms before the lockdown and both the subjects had a history of screen usage for more than 4 hours before the lockdown. Whereas, almost 21 subjects asserted to have experienced dry eye symptoms during the lockdown. There was an alteration in the sleep pattern of 11 subjects

during lockdown period in view of the varied duty hours, which also has a role to play in the development of DED.

DISCUSSION

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.[8]

The use of video display terminals (VDT) and staring at screens of technologic devices, including desktops, laptops, tablets, and smartphones have become ubiquitous in a wide range of age groups because of the rapid advance of network culture-mediated communications.[9] Today's visual requirements may include working on laptop, computers, electronic book readers, smart phones and other electronic devices either in the workplace, at home or in the case of portable equipment, in any location.[10]

In our study, we saw a dependence of all the 50 (100%) subjects over VDTs for up to 6 hours for various purposes like entertainment, communication, work and study during normal routine life. There was a jump of mean hours of 3.44, usage of VDTs in our subjects as the lockdown was announced.

Tear film maintains moisture and oxygen balance of cornea. Blink reflex facilitates resurfacing of the precorneal tear film.[11] Reduction of the spontaneous eye-blink rate during VDT use is primarily determined by marked visual attention, resulting in an exacerbation of dry eye symptoms in predisposed humans.[12]

To facilitate an understanding of the mechanisms of VDT-associated dry eye, as well as to develop novel treatment approaches, a VDT worker dry eye model was created. The procedure involved placing rats on a swing in combination with exposure to an evaporative environment. This animal model reveals that the blink frequency was reduced to one-third of the nonswing riding levels, which is similar to the results that have been reported by VDT users. Pathologic analysis of the lacrimal gland in this dry eye model showed that the decrease in tear secretion was accompanied by a decrease in the acinar cell number, and an enlargement of acinar cells was accompanied by filling with an increased volume of secretory vesicles and a loss of intracellular cell structure, suggesting the involvement of lacrimal hypofunction.[9]

11 subjects with altered sleep pattern in our study, also complained also DED. Motoko Kawashima et al. found that sleep quality is associated with DED. A sleep disturbance seems to be an influencing factor on DED, especially on dry eye symptoms.[13] Moreover, blue light emission from VDTs can suppress the synthesis of melatonin, particularly in young population. Decrease in melatonin level might lead to disruption of sleep cycle which eventually will lead to affect their profession which needs proper visual attention.[14]

To diagnose and grade the DED, various objective tests such as Schrimer's test and TBUT test are available. However, these tests show poor repeatability, significant inter-observer variability and correlate poorly with the patient symptoms as well as the quality of life. There has been superiority of questionnaires over objective tests as a screening tool[8,15,16] Also, in accordance to the prevailing times of coronavirus, there has been suggeston of lower probability of disease transmission through tears.[17] Hence, the dry eye tests were not carried out for our study.

In our study, OSDI questionnaire was used as the subjective method of grading the DED. Its shorter completion time, easy comprehension by patients, and no additional cost make it ideal for clinical use in the outpatient department.[18,19] Based on the OSDI survey, the incidence of DED in our study during the lockdown period is 46% which was directly proportionate to exposure time on VDTs during the lockdown. Out of the 23 subjects developing DED, maximum subjects (43.47%) fall in the category of spending 9-12 hours on VDTs and the 1 subject developing severe grade DED also falls in the same category. Therefore, establishing the role of increased number of hours of VDTs on development of DED and its severity.

The duration of exposure is a high predictor of the development of VDT induced dry eye, even if the exposure has been discontinued.[20] Other studies have found significance between time exposed to VDTs and development of dry eye due to VDT in a duration of 6 or 7 hours of exposure.[21] Computer use 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.[22] Jeewan Singh et all in their study observed 89.98% of dry eye cases with 4 h or more of VDT usage had severe DED.[8]

The subjects in our study were between the age-group of 21-30 years. Jeewan Singh et al. in their study, concluded the majority of patients with DED were in the age group of 21–40 years.[8] The previous epidemiological studies often exclude this age group, and may, therefore, have underestimated the true prevalence of DED.[23,24,25]

On gender distribution, other studies found women being more affected with DED than men due to hormonal changes during menopause[26,27] whereas in our study no gender discrimination was seen, as the age-group under study doesn't include menopausal females.

In our study, we saw that individuals can have dry eye due to long duration of exposure to VDTs from mild to severe in grade. They were then counseled for the use of lubricating eye drops, PUFA supplements and avoidance of CLs and treating any other preexisting ocular surface disorder yield benefit in maintaining healthy ocular surface and preventing related symptoms.[28]

Less than one hour of single spell of work and work-rest schedule with breaks frequenting at every 15 min followed by micro-breaks or at 30 min followed by 5 min breaks has been found to significantly increase work efficiency, reduce eye symptoms and prevent musculoskeletal strain.[28]

An interventional study using the dry eye model showed that oral supplementation of some natural ingredients is a possible therapy for relieving symptoms of VDT-associated dry eye.[9] Avoidance of sitting in front of A.C or in a room with low humidity and eye breaks during computer use by 20-20-20 rule i.e. every 20 min, look away at 20 feet for 20 s.[29]

The subjects in our study were even counseled and described 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, and 10 feet (about 3 meters) for the television screens.[30]

CONCLUSION

The prevalence of dry-eye disease (DED) among medical professionals in a tertiary care hospital in Western UP during the lockdown period 2020 was 46%. This was attributed to the increased dependence on VDTs for various purposes. VDT use is associated with a profound decrease of the blink rate in healthy subjects and deterioration in the sleep quality and quantity., Awareness about VDT related dry eye and its management with regular screening has become a must in the prevailing times.

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