

Impact of prolonged digital screens exposure on ocular surface and management

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Background: Prolonged digital screen exposure is the cause of several symptomatic eye issues. **Aim:** To evaluate the effect of prolonged screen time on ocular surface. **Material and methods:** This was a prospective, observational and longitudinal study was conducted on 314 patients at Military Hospital Jabalpur from 2012 to 2014. **Result:** Age of subjects ranged from 18 years to 80 years with mean age of 39.6 ± 16.4 years. There were 163 males and 151 females. Head ache was commonest symptom followed by redness. OSDI score, Schiemiens and F – BUT was significantly differed in those with < 8 hours of exposure and those > 8 hours of exposure. Corneal straining and central corneal straining also differed in both groups. Lubricating eye drops provided significant relief. **Conclusion :** Prolonged digital exposure causes various symptoms in the eye ranging from redness to irritation to dry eyes. Higher the exposure time, higher is the damage – both conjunctival and corneal. Lubricants have role in mitigating such symptoms.

Keywords ; Ocular digital exposure, dry eye, redness in eye,

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Introduction

Digital era has thrown open myriad of opportunities as well as challenges. Invariable eye is at the receiving end. As the work pattern is going more digital, invariable the toll on overall health in general and on eye in particular is increasing. While most of symptoms are may be transient, this can also cause serious and frequent discomfort for patients. This will also have important impact on workforce when computer users are affected through frequent errors and more frequent sick days[1]. It is seen that most of patients keep performing a self-indulging task (e.g. playing video games) with great concentration, hours together, until the person get exhausted. There may be few, if any, breaks. Longer duration of activity without a mandatory break can cause accommodative eye issues and dry eye. Accommodation and refractory problems may occur as a because of the lens focussing wrongly and locked in state. This may cause accommodation spasm with consequent eye issues[2]. Dry eye may occur because of an uneven lubrication and its distribution over the eye due to reduced frequency of blinking. Blinking is often reduced by induced concentration and staring directly at digital or video screen. Adding to this, computer screens usually are located higher in the field of view than traditional reading habits of pen and paper. As a consequence, upper eyelids get retracted to a large extent. Hence, the eye tends to experience more than the normal amount of lubricant evaporation with consequent dryness and irritation[3]. Portello et al in their study also observed that a clear split of computer-related symptoms into two categories - those causing issues with accommodation (Foe example - blurred near vision, blurred distance vision after use of computer and challenge in refocusing from one of patient's condition but also lead to

point to another) versus those linked to issues of dry eye (irritation and burning of eyes, dry eyes, strain of eyes, headache, tired eyes, avoidance to bright lights and eye discomfort)[4]. Sheedy *et al* proposed that reduction in blink rate may be a consequence of involuntary squinting under symptom producing conditions and subsequent squinting contributing to asthenopia. Potential benefits afrom squinting: improving in acuity of vision with refractive error and decreasing l illumination of retina in the presence of a source of glare in the superior visual field. The induced squint response, measured using EMG of the orbicularis oculi, may influence the blink rate majorly, with higher squint levels causing more significant reduction of blink rate[5]. Lubricating eye drops have been proposed as a symptomatic therapy for eye strain consequent to prolonged digital exposure. Various studies have observed that lubricating eye drops provide transient relief from eye strain. Various other molecules are under clinical trial for the same.

Aims and objective: To evaluate the effect of prolonged screen time on ocular surface.

Materials and methods

This was a prospective, observational and longitudinal study conducted at Military Hospital Jabalpur from 2012 to 2014. Sample size of 314 was considered for the study, out of which 149 patients had < 8 hours of exposure and 165 patients had > 8 hours of exposure. Patients of age > 18 years and < 80 years of either gender was recruited for the study. Patients with pre-existing eye disease was excluded from the study. After the ocular examinations, lubricant was prescribed and feedback was collected in next visit.

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Result

Table 1: Age and gender profile of study group

Age groups	Males	Females
< 20 years	03	11
20 – 30 years	47	50
30 – 40 years	29	31
40 – 50 years	33	22
50 – 60 years	19	28
>60 years	12	19
Total	163	151

Table 2: Mean digital exposure duration of study group

Age groups	Mean exposure duration in males (hours/day)	Mean exposure duration in females (hours/day)
< 20 years	9.57 ± 1.7	9.14 ± 2.1
20 – 30 years	7.08 ± 1.2	6.00 ± 2.3
30 – 40 years	8.71 ± 1.4	8.57 ± 1.6
40 – 50 years	8.80 ± 1.5	8.57 ± 1.1
50 – 60 years	9.53 ± 1.6	7.71 ± 1.5
>60 years	7.96 ± 1	7.29 ± 1.4
Total	8.52 ± 1.4	7.93 ± 1.5

Table 3: Presenting symptoms

Symptoms	No of patients
Redness	196
Headache	212
Dry eyes	154
Lack of concentration	65
Excessive watering of eyes	36

Table 4: Ocular test results

Tests	< 8 hours (n=149)	>8 hours (n=165)	P value
OSDI score	32.65 ± 3.47	39.22 ± 4.36	0.041
Schiermer's	10.54 ± 2.11	17.32 ± 3.22	0.023
F – BUT	3.24 ± 0.71	1.92 ± 0.93	0.046
Conjunctival straining	65.1%	72.7%	0.011
Corneal straining	71.8%	76.4%	0.030
Central corneal straining	10.7%	14.5%	0.045

Table 5: OSDI score grading

Grading	< 8 hours (n=149)	>8 hours (n=165)
Mild	9.40%	6.06%
Moderate	30.20%	23.64%
Severe	60.40%	70.30%

Table 6: Management of dry eye with lubricants

Variable	< 8 hours (n=52)	>8 hours (n=63)	P value
Improvement seen	23	22	0.46
No improvement	29	41	

Discussion

Most common presenting complaints in our study were head ache and redness of the eyes. Other symptoms included complaints were headache, heaviness, foreign body sensation, pain, glare and blurring in decreasing frequency. These symptoms may be caused by poor lighting, glare, an improper work station set-up, vision problems of which the person was not previously aware, or a combination of these factors. As per OSDI grading, there was significant difference between those who had < 8 hours of exposure and those who had > 8 hours exposure ($p < 0.05$). In a study by Awasthi et al, mean OSDI was 31.77 ± 8.75 in subjects with digital exposure < 8 hours and 41.58 ± 11.50 in subjects with digital exposure > 8 hours [6]. Unlu et al did not found significant correlation between exposure duration

(range 1-12 hours) and OSDI. They also reported 42% incidence of dry eyes with FBUT and 35% incidence with OSDI > 35. They found significant correlation of FBUT with OSDI in diagnosis of DES [7]. In our study, Schirmer's was in normal range in 68.5 % of the patients with < 8 hours of exposure and 67.8% in patients with < 8 hours of exposure. Avasthi et al observed Schirmer's was in normal 78.5 % of patients. We noted that Schirmer's was 10.54 ± 2.11 in subjects with digital exposure < 8 hours and 17.32 ± 3.22 in subjects with digital exposure > 8 hours. Awasthi et al observed that Schirmer's was 11.81 ± 6.53 in subjects with digital exposure < 8 hours and $16.25 \pm .32$ in subjects with digital exposure > 8 hours. F-BUT was 3.24 ± 0.71 and 1.92 ± 0.93 respectively among those with > 8 hours and < 8 hours of exposure. It was 3.56 ± 2.55 and 2.81 ± 1.86

respectively in study by Avasthi et al. Conjunctiva staining was present in 65.1% and 72.7% of patients, corneal staining was present in 71.8% and 76.4% of patients with > 8 hours and < 8 hours of exposure. In our study, among those who had < 8 hours of exposure per day, 9.40% had mild diseases, 30.20% had moderate disease, and 60.40% had severe disease. Among those who had > 8 hours of exposure per day, 6.06% had mild diseases, 23.64% had moderate disease, and 70.30% had severe disease. Various studies have observed that use of lubricating eye drops has been shown to reduce symptoms such as tiredness, dryness and difficulty focusing during sustained computer use, although complete resolution of symptoms may not occur [8,9]. We noted that 44.2% of patients who had < 8 hours of exposure and 34.9% of patients who had > 8 hours of exposure had improvement as stated by patients. However, repeat test was not performed due to logistic reasons. The difference was statistically significant indicating role of lubricants in management of prolonged exposures to digital screens. Bhargava et al observed in their study of 478 symptomatic computer users (>3 hours per day) demonstrated a beneficial effect of dietary supplementation with omega-3 fatty acids on dry eye signs and symptoms, with 70% in the treatment group being symptom free after 3 months. However, we did not use any supplement [10].

Conclusion

Prolonged digital exposure causes various symptoms in the eye ranging from redness to irritation to dry eyes. Higher the exposure time, higher is the damage – both conjunctival and corneal. Lubricants have role in mitigating such symptoms.

Conflict of Interest: Nil

Source of support: Nil

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