Original Article

Effect of Screen Time on Eye Dryness

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ABSTRACT

Purpose: To determine the relationship between screen time and dry eye: A hospital based study.

Study Design: Cross sectional, observational.

Place and Duration of Study: Helper's eye hospital, Quetta from June 2020 to August 2021.

Methods: There were 62 subjects, age 13 – 71 years, either gender with dry eye symptoms, normal anterior and posterior segment and daily use of screen devices such as mobile and laptop. Tear film break-up time was performed in all the patients to confirm dry eye using fluorescein strip. Screen time per day was graded as mild (< 2 hours), moderate (2 – 6 hours) and marked (> 6 hours). Chi square test was performed for data analysis on SPSS version 23 and P ≤ 0.05 was considered statistically significant.

Results: Mean age of the patients was 44.34 ± 16.43. There were 66.1% females and 33.9% males. The commonest symptom was itching (35.5%). Tear film break up time test was positive in 37 (59.7%). Out of 18 patients with mild screen time, 10 (55.5 %) subjects had dry eye. Out of the 23 subjects with moderate screen time, 17 (73.9%) had dry eye while out of 21 subjects with severe screen time, 10 (47.6%) had dry eye. The results of our study were not statistically significant with p value 0.189.

Conclusion: There is no association between increased screen time and the dry eye. However, care must be taken to prevent the discomfort arising from excessive screen time.

Key Words: Dry eye, Tear film break-up time, Tears, Digital screen.

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INTRODUCTION:

Dry eye may be because of insufficient tear production or excessive evaporation of tears. The Tear film break-up time is one of the tests to diagnose dry eye.[1] Functions of the tear film are lubrication, oxygen and nutrient supply to the eyes. It also clears away debris from the surface of the eyes.[2] Symptoms of dry eye reported in literature include grittiness, photophobia and blurred vision.[3,4,5] Use of smart phone has increased over the past many years and life has become dependent upon such devices.[6] It leads to visual concerns due to significant occupational and physical dependence on these devices.[7] Screen devices and computer use is increasing among individuals resulting in infrequent blinking and tears evaporation.[8] The use of computers reduces the blinking rate from 18.4 blinks/min to 3.6 blinks/min.[9] The screen time is proposed to be one of the risk factor for dry eye condition.[10]

This study was conducted to find out whether the symptoms reported by digital screen users are actually related with the dry eyes.

METHODS

This observational study was carried out at Helper's eye hospital, Quetta from June 2020 to August 2021 after approval from ethical review committee.

Informed consent was taken from all the patients. The study was done according to the Declaration of Helsinki. Sample size was calculated using 95% confidence interval and 9.6% prevalence.[13??] Sample collection was through non-probability consecutive technique. The study included 62 subjects aged 13 – 71 years, either gender, with dry eye symptoms, normal anterior and posterior segment and frequent use of screen devices such as mobile and laptops. Screen time duration of usage per day was graded as mild (< 2 hours), moderate (2 – 6 hours) and marked (> 6 hours). Complete eye examination was done including refraction, slit lamp biomicroscopy and fundoscopy. Tear film break-up time was performed in all patients to confirm dry eye using fluorescein strip placed in the lower fornix of the eye. The tear film was examined with cobalt blue filter while the upper eyelid was held to prevent blinking. The interval between the last blink and appearance of the first dry spot was noted which indicated the presence of dry eye. Break-up time of < 10 seconds was labeled as positive for dry eye.

Data analysis was done using SPSS version 23. Qualitative data including gender, dry eye symptoms, screen time and tear film break-up time were presented as frequency and percentage. Mean ± standard deviation (SD) was calculated for age of the patients. Chi square exact test was used to evaluate the relationship between screen time and dry eye. $P \leq 0.05$ was regarded as statistically significant.

RESULTS

Mean age of the patients was 44.34 ± 16.43 (13 – 71 years). There were 66.1% females. The commonest symptom was itching (35.5%) as shown in Table 1. Tear film break up time was positive in 37 (59.7%). Table 2 shows out of 18 patients with mild screen time of < 2 hours, 10 (55.5%) had dry eye. The results of our study showed no statistical significance with P value 0.189 which indicates that there is no association between dry eye and prolonged screen time (Table 3).

Table 1: *Dry eye symptoms.*

Dry eye Symptoms	Frequency	Percentage
None	9	14.5
Foreign body sensation	6	9.7
Burning	11	17.7
Itching	22	35.5
Foreign body sensation, Burning and Itching	14	22.6
Total	62	100

Table 2: *Tear Film Breakup Time and Daily Screen Time of Patients.*

Tear Film Breakup Time	Daily Screen Time of Patient			Total
	Mild (< 2 Hours)	Moderate (2 – 6 Hours)	Marked (>6 Hours)	
Positive	10 (55.5%)	17 (73.9%)	10 (47.6%)	37 (59.7%)
Negative	8 (44.4%)	6 (26%)	11 (52.3%)	25 (40.3%)
Total	18 (29%)	23 (37%)	21 (33.8%)	62

Table 3: *Association of dry eye and screen time (n = 62).*

	Value	df	Asymptotic Significance (2-Sided)
Pearson Chi-Square	3.333[a]	2	.189
Likelihood Ratio	3.415	2	.181
Linear-by-Linear Association	.337	1	.561

DISCUSSION

Higher angle of gaze and eye opening for longer period of time while using screen aggravates tear evaporation and worsens dryness in eyes.[11] In our study, dry eye was present in 59.7% subjects. Mufti reported dry eye in 55.6% patients due to digital screen exposure which is similar to our study.[12] Few studies in Pakistan reported dry eyes in 9.6%, 23.8% and 28% of computer users.[13,14,15] Our results show that screen time is not actually associated with dry eye. The results of our study are supported by many other researchers as well. In a study by Tripathi et al no association was found between dry eye and screen time.[16] Akkaya et al, concluded that there is no significant change in dry eye tests with prolonged computer use.[17] Jansen at al reported that there is no relationship between screen time and dry eye symptoms.[18] Another research showed no association between dry eye symptoms and digital screen time.[19] Unlu et al observed similar results having no correlation between screen time and break-up time.[20] Break-up time measures stability of tear film rather than tear production.[16] Bjerrum found that breakup time has high sensitivity but low specificity therefore

the reliability of this test improves with the severity of dry eye.[21] This indicates that evaporative dry eye is more prevalent due to screen use than decreased tear production.

Titiyal JS et al, noted dry eye in 89.9% cases using video display units for < 4 hours.[11] According to our study, 55.5% patients with < 2 hours of screen time, 73.9% patients with screen use of 2 – 6 hours and 47.6% patients having screen time of > 6 hours had dry eyes. On the contrary some studies demonstrated association of screen time with dry eye disease.[22,23] Uchino Y et al, reported burning in 58.3% as the most frequent symptoms in digital screen users while in our study the most common symptom was itching in 35.5% cases. [24]

The limitation of our study was smaller sample size and number of more housewives in our study sample. It also did not determine the pattern of screen usage and environmental conditions that can influence dry eye. Future researches should include these factors and perform the combination of tests such as break-up time, schirmer test and ocular surface disease index score for dry eye.

CONCLUSION

Although our study proves no positive association between screen use and dry eyes but people should be educated and advised regarding the best practice of digital screen use. Regular eye checkups, frequent blinking, lowering the position of digital screen, reducing the screen time and following the 20-20-20 rule of taking periodical break of 20 seconds after every 20 minutes to look at 20 feet away is recommended.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board **(Ref No. 972/73).**

REFERENCES

1. **Mehra D, Galor A.** Digital Screen Use and Dry Eye: A Review. Asia-Pac. J. Ophthalmol. 2020;**9:**491–497. Doi :10.1097/APO.0000000000000328
2. **Javadi MA, Feizi S**. Dry eye syndrome. J Ophthalmic Vis Res. 2011;**6:**192–198. PMCID: PMC3306104
3. **Galor A, Levitt RC, Felix ER, Sarantopoulos CD.** What can photophobia tell us about dry eye? Expert Review of Ophthalmology. 2016;**11(5):**321–324. Doi:10.1080/17469899.2016.1222905
4. **Kalangara JP, Galor A, Levitt RC, Covington DB, McManus KT, Sarantopoulos CD, et al.** Characteristics of ocular pain complaints in patients with idiopathic dry eye symptoms. Eye Contact Lens. 2017;**43(3):**192–198. Doi:10.1097/ICL.0000000000000249
5. **Koh S.** Mechanisms of visual disturbance in dry eye. Cornea. 2016;**35(11):**S83–88. Doi:10.1097/ICO.0000000000000998
6. **Kim DJ, Lim CY, Gu N, Park CY.** Visual fatigue induced by viewing a tablet computer with a high-resolution display. Korean J Ophthalmol. 2017;**31:**388–393. Doi:10.3341/kjo.2016.0095
7. **Rosenfield M.** Computer vision syndrome: a review of ocular causes and potential treatments. Ophthalmic Physiol Opt. 2011;**31:**502–515. Doi:10.1111/j.1475-1313.2011.00834.x
8. **Van Tilborg MM, Murphy PJ, Evans KS.** Impact of Dry Eye Symptoms and Daily Activities in a Modern Office. Optom Vis Sci. 2017;**94:**688–693. Doi:10.1097/OPX.0000000000001086
9. **Patel S, Henderson R, Bradley L, Galloway B, Hunter L.** Effect of visual display unit use on blink rate and tear stability. Optom Vis Sci. 1991;**68(11):**888-892. Doi: 10.1097/00006324-199111000-00010.
10. **Shirley Z.** Prevalence of dry eye symptoms and relationship to screen time in a New York City pediatric population. Invest. Ophthalmol. Vis. Sci. 2020;**61(7):**340.
11. **Titiyal JS, Falera RC, Kaur M, Sharma V, Sharma N.** Prevalence and risk factors of dry disease in north India. Ocular surface disease index based cross sectional hospital study. Indian J Ophthalmol. 2018;**66:**207-211.Doi:10.4103/ijo.IJO_698_17
12. **Mufti M, Imran Sayeed S, Jaan I, Nazir S.** Does digital screen exposure cause dry eye? Indian Journal of Clinical Anatomy and Physiology. 2019;**6(1):**68–72.Doi: 10.18231/2394-2126.2019.0017
13. **Maroof S.** Relationship of screen hours with digital eye strain: a cross sectional survey from teenagers. Pak Armed Forces Med J. 2019;**69(1):**182-186.
14. **Deeba F.** Prevalence of computer vision syndrome among undergraduate physical therapy students. Pak J Rehabil. 2021;**10(2):**63-68. Doi: 10.36283/pjr.zu.10.2/012
15. **Mansoori N, Qamar N.** Dry Eye Syndrome and Associated Risk Factors among Computer Users in Karachi, Pakistan. Ann Abbasi Shaheed Hosp Karachi Med Dent Coll.2017. Doi: 10.58397/ashkmdc.v22i3.123

16. **Tripathi A, Agarwal R, Kharya P.** Dry eye disease related to digital screen exposure in medical students. Pan-AmJOphthalmol.2022;**4(1):**35. Doi: 10.4103/pajo.pajo_16_22
17. **Akkaya S, Atakan T, Acikalin B, Aksoy S, Ozkurt Y.** Effects of long-term computer use on eye dryness. North Clin Istanb. 2018;**5:**319-322. Doi: 10.14744/nci.2017.54036
18. **Jansen J, Kuswidyati C, Chriestya F.** Association between screen time and dry eye symptoms. Jurnal Kedokteran dan Kesehatan Indonesia, 2021. Doi: 10.20885/JKKI.Vol12.Iss2.art7
19. **Mowatt L, Gordon C, Santosh ABR, Jones T.** Computer vision syndrome and ergonomic practices among undergraduate university students. Intern J Clin Prac. 2018;**72(1)**. Doi:10.1111/ijcp.13035
20. **Unlü C, Güney E, Akçay Bİ, Akçalı G, Erdoğan G, Bayramlar H.** Comparison of ocular-surface disease index questionnaire, tearfilm break-up time, and Schirmer tests for the evaluation of the tearfilm in computer users with and without dry-eye symptomatology. Clin Ophthalmol. 2012;**6:**1303-6. Doi: 10.2147/OPTH.S33588
21. **Bjerrum KB.** Test and symptoms in keratoconjunctivitis sicca and their correlation. Acta Ophthalmol Scand. 1996;**74:**436-441. Doi:10.1111/j.1600-0420.1996.tb00595.x
22. **Kawashima M, Yamatsuji M, Yokoi N, Fukui M, Ichihashi Y, Kato H, et al.** Screening of dry eye disease in visual display terminal workers during occupational health examinations: The Moriguchi study. J Occup Health, 2015;**57(3):**253-258. Doi: 10.1539/joh.14-0243-OA.
23. **Alkabbani S, Jeyaseelan L, Rao AP, Thakur SP, Warheka PT.** The prevalence, severity, and risk factors for dry eye disease in Dubai – a cross sectional study. BMC Ophthalmol. 2021;**21:**219. Doi: 10.1186/s12886-021-01978-4
24. **Uchino Y, Uchino M, Dogru M, Ward S, Yokoi N, Tsubota K.** Changes in dry eye diagnostic status following implementation of revised Japanese dry eye diagnostic criteria. Jpn J Ophthalmol. 2012;**56(1):**8-13. Doi: 10.1007/s10384-011-0099-y.

Author's Designation and Contribution

Madiha Waseem; Consultant Ophthalmologist: *Design, Literature Search, Data Analysis, Statistical Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*

Mehvash Hussain; Assistant Professor: *Concepts, Design, Literature Search, Data Analysis, Statistical Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review*

Mahtab Mengal; Consultant Ophthalmologist: *Literature Search, Data Acquisition, Data Analysis, Statistical Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*