



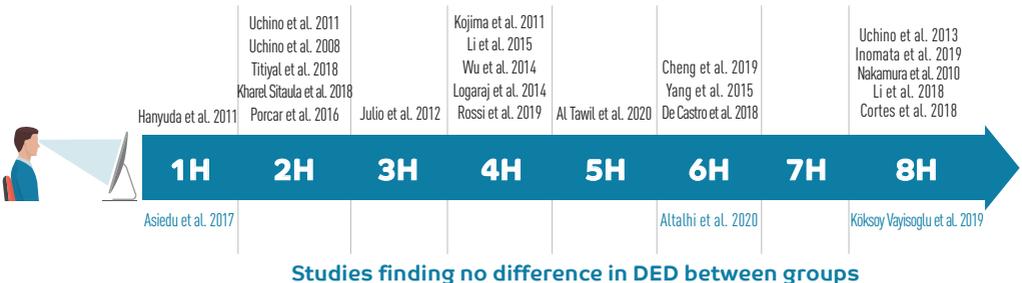
HOW TO DEAL WITH EYESTRAIN FROM EXCESSIVE SCREEN USE



EPIDEMIOLOGICAL FINDINGS

- The prevalence of Dry Eye Disease (DED) seems to be approximately **doubled in heavy screen users** compared to the general population⁽¹⁾.
- The average prevalence of DED among screen workers is higher (50%) than the prevalence in the general population⁽²⁾.
- Heavy smartphone use in children (**over 3 hours per day**) can cause DED with punctate epithelial erosions. After 4 weeks without a smartphone, the signs and symptoms disappear⁽³⁾.
- In middle school children, a correlation was shown between symptoms and objective signs of dry eye, and **worsening of clinical signs and time spent in front of a computer**⁽⁴⁾. Indeed, **25% of middle school children** reported ocular fatigue as soon as 30 minutes of screen exposure and it rises to 55.8% in the group exposed between 1-9 hours, to 76.2% between 10-19 hours, to 85.7% for 20 hours and more⁽⁴⁾.
- In a recent review, **as little as 1-2 hours a day** of visual display terminals use was found to be associated with DED⁽⁵⁾:

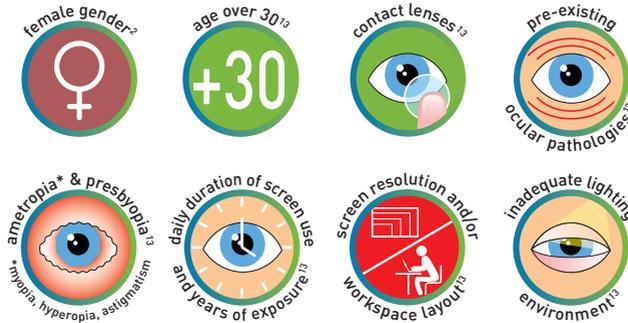
Studies finding worse outcomes in DED according to daily duration of visual display terminals use



- The high prevalence of DED observed **can be due to prolonged screen use and the subsequent pathophysiological processes** including tear evaporation and tear film instability⁽⁵⁾.

CLINICAL FACTS

- **Digital eye strain** is defined as “**the development or exacerbation of recurrent ocular symptoms and/or signs related specifically to digital device screen viewing**”⁽⁶⁾. It is characterised by a group of eye and vision-related problems resulting from prolonged usage of computers, tablets, e-readers, and cell phones⁽⁷⁾.
- **Eye fatigue** is the main symptom of DED in screen users⁽⁸⁾. Constant focusing during the day stresses the eye muscles leading to eye fatigue and discomfort causing headaches.
- DED with objective signs is **diagnosed in 51%** of people with visual fatigue⁽⁹⁾.
- Computer use **reduces blink frequency by a factor of 5-6** compared to the physiological blink at rest, and induces incomplete blinks⁽¹⁰⁾.
- Most studies reported a **worsening in tear Break-Up Time (tBUT)** after prolonged screen use⁽⁵⁾.
- Reduced blinking promotes **tear evaporation**, as do incomplete blinks and horizontal gaze (computer screen)^(10,11,12).
- Screen use **decreases tear volume, degrades tear composition, promotes tear film instability, impairs thickness and quality** of the tear film lipid layer⁽¹⁰⁾.
- Risk factors of screen-related DED are:



Digital Eye Strain presents a major challenge in the future, with increased use of visual display terminals in all aspects of life, at work, in education, and in daily life.

CLINICAL STUDY⁽¹⁴⁾

TITLE: Improving Visual Comfort during Computer Gaming with Preservative-Free Hyaluronic Acid Artificial Tears Added to Ergophthalmological Measures.

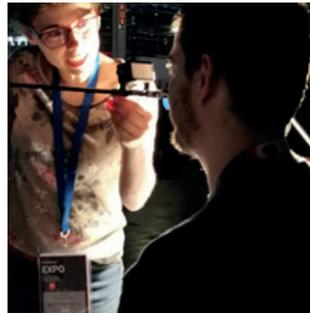
AUTHORS: Fernando Trancoso Vaz, Ester Fernández-López, María José Roig-Revert, Alicia Martín and Cristina Peris-Martínez.

JOURNAL: Vision

Design of the study

This study has been designed to evaluate the efficacy of ergophthalmological measures, combined with preservative-free 0.15% hyaluronic acid (Hyabak[®], medical device, Laboratoires Théa, Clermont-Ferrand, France) on the short-term management of the signs and symptoms of dry eye and digital asthenopia before and after prolonged digital screen use.

This 3-day study included 56 participants of a videogames center who planned to play videogames for ≥ 6 h/day, randomized in two groups.



Courtesy of Alicia Martín



HYABAK®
 **DROP**
 4 times a day

 **Ergophthalmological measures***

Ergophthalmological measures* only



- Gaming habits questionnaire**
- Standard Patient Evaluation of Eye Dryness (SPEED questionnaire)
- Clinical evaluation:
 - » Conjunctival hyperemia,
 - » Corneal and conjunctival staining
 - » Fluorescein TFBUT
 - » Schirmer I test
 - » Visual acuity and near point of convergence and accommodation
- Symptoms questionnaire from 0 to 10 to assess ocular fatigue, blurred vision, burning or ocular pain, ocular dryness, and ocular discomfort

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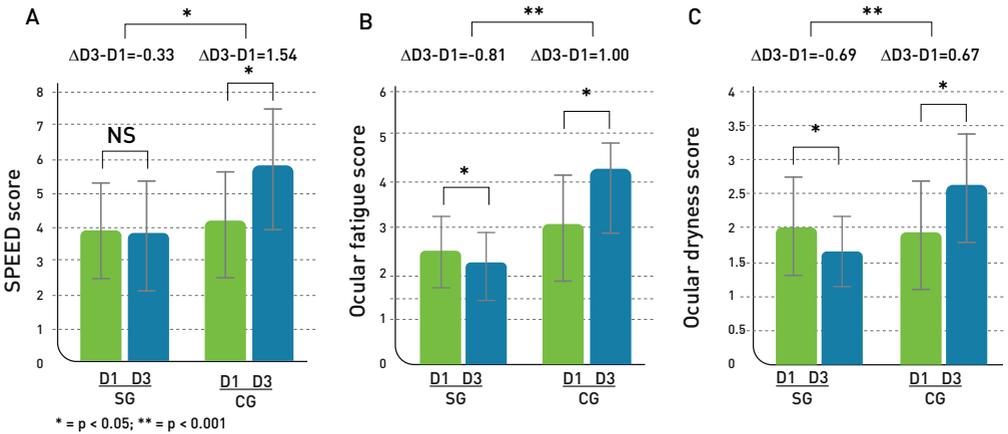
*20-20-20 rule (cf. p8) and regular breaks

**Comprising hours playing/week, minutes between breaks, break duration, game devices (such as computer, video console, tablet), game devices used/day.

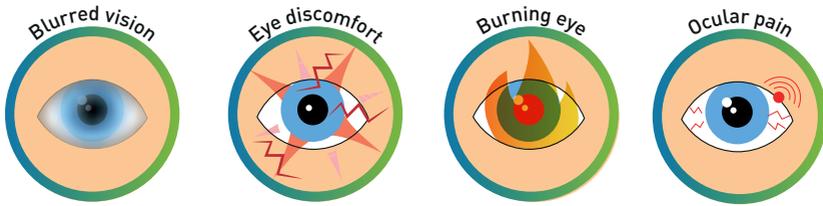
Results

After 3 days, there was no statistically significant difference in the subjective symptom SPEED score between D1 and D3 for the Study Group (SG) ($p = 0.4621$). However, a significant increase in subjective symptoms was observed in the Control Group (CG) ($p = 0.0320$).

The SG showed a significant decrease in ocular fatigue ($p = 0.0149$) and ocular dryness ($p = 0.00427$), whereas the CG presented significant increases in both parameters ($p = 0.0173$ and $p = 0.0463$)



Change in the SPEED score (A), ocular fatigue score (B), and ocular dryness score (C) from D1 to D3 for the SG and CG. The bars represent means, and the error bars the 95% confidence interval. Statistical significance: *, $p < 0.05$; **, $p < 0.001$. CG, control group; D1, Day 1; D3, Day 3; $\Delta D1 - D3$, difference between Day 1 and Day 3; NS, not significant; SG, study group



- No differences were observed regarding the change in the blurred vision score, eye discomfort score, and burning and ocular pain score assessed in the ophthalmic evaluation in D1 and D3 for the SG or the CG.
- The subjective questionnaire completed by SG reported that 83% of the participants felt better or much better after instillation of Hyabak®.
- 2 adverse events were reported but not linked to the study treatment (yellow ocular secretion and faintness).

CONCLUSION

Preservative free 0.15% hyaluronic acid, and concomitant use of ergophthalmological measures such as regular breaks, could have a protective effect against dry eye symptoms associated with prolonged and/or intensive visual display terminal use.

HOW TO PREVENT & RELIEVE EYESTRAIN LINKED TO SCREEN USE?

There are some advice and exercises that might help your patients keep their eyes comfortable if they work at a computer all day.

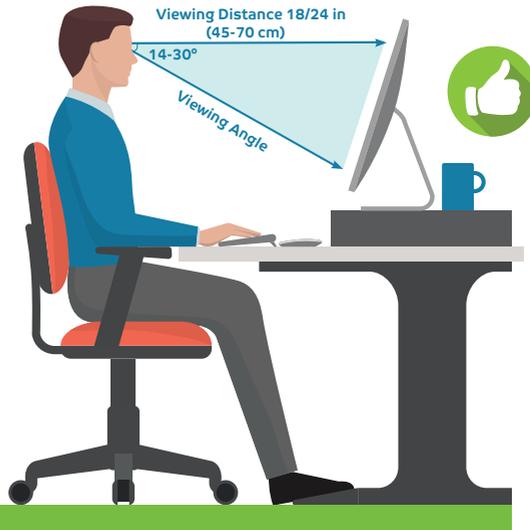
1 Adopt a good posture and work under good lighting conditions:

USE THE 20/20/20 RULE
TO PREVENT DIGITAL EYESTRAIN⁽¹⁵⁾



Every 20 minutes of screen time, look at an object 20 feet (6 m) away for 20 seconds.

- Ambient illumination should be reduced by half compared to normal lighting⁽¹⁶⁾.
- The viewing angle should be at least 14° . The screen should be matte if possible (flat screen) or covered with an anti-reflection film. The brightness of the screen should be adjusted to match that of the environment and the contrast should be as high as possible. The screen should be dust-free⁽¹⁶⁾.



2 Practice ocular yoga exercises

- Prolonged use of screens, for example at work, demands excessive working of the extraocular and ciliary muscles. This may cause ocular fatigue and other associated asthenopic symptoms.
- Studies have shown that ocular yoga exercises reduce ocular fatigue by increasing the ocular muscle efficiency⁽¹⁷⁾. See how you can practice ocular yoga:
- The exercises below can help decrease the prevalence and incidence of eye fatigue minimizing eyestrain and discomfort at work (adapted from Gupta et al. 2020)⁽¹⁷⁾.



PALMING

Rubbing your palms and placing them on your eyes will bring comfort.



ROTATE YOUR EYES

Move your eyes all the way round in a circle.



FIGURE OF EIGHT

Tracing the figure eight will strengthen your eye muscle and improve its flexibility.



DIAGONAL VIEWING

Count to 2 seconds each time looking at all four diagonal corners.



BLINKING

Blink for 10 seconds with your eyes wide open. Then close your eyes for 20 seconds. Repeat the exercise.

3 Use artificial tears liberally

As you know, the blink rate goes down when patients sit in front of a computer. Lubricant eye drops can ensure their eyes stay lubricated and relieve the symptoms of eye strain. Ensure to use preservative-free artificial tears as preservatives may be counterproductive and further increase the dry eye symptoms⁽¹⁹⁾. Indeed, preservatives in the short term can affect the ocular surface. In the long term the toxicity can even impair the deep structures of the eye⁽¹⁹⁾.

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