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Do Blue Light Filtering Glasses Reduce Symptoms of Computer Vision Syndrome?

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No financial disclosures to report

Introduction

- Blue light is a high-energy short-wavelength (400-500 nm) visible light
- Blue light exposure is typically inconsequential, but chronic daily exposure is a growing concern in modern life
- Sources of blue light include the sun, digital screens (TVs, computers, laptops, smart phones, tablets), electronic devices, and fluorescent/LED lighting.
- American daily screen time is recorded over 10.5 hours/day[1]
- Computer Vision Syndrome (CVS, or digital eye strain) is a combination of symptoms thought to be related to excessive screen time
- As radiologists, we are at high risk of CVS and occupational risks that involve excessive screen time

Computer Vision Syndrome

- CVS = **range of eye and vision related symptoms** secondary to prolonged digital screen exposure[2]
- Sequelae of CVS can extend beyond the physical eye symptoms and can **negatively affect both quality of life and work productivity**[3]
- CVS is reported in **nearly 70% of all computer users**[4,5]
- A 16-item questionnaire was developed and validated to measure extent of symptoms[6]:

Burning	Dryness
Itching	Blurred vision
Feeling of a foreign body	Double vision
Tearing	Difficulty focusing for near vision
Excessive blinking	Increased sensitivity to light
Eye redness	Colored halos around objects
Eye pain	Feeling that sight is worsening
Heavy eyelids	Headache

Purpose

- This study evaluates the effect of blue light filtering (BLF) glasses in the setting of a normal diagnostic clinical duties and symptoms associated with CVS and occupational fatigue

Materials and Methods

- Institutional Review Board approved prospective crossover study
- 10 radiology residents
- 10 pairs of glasses (5 BLF and 5 sham) purchased at full price from commercial company that creates clear lens
- Crossover design:
  - 5 residents in BLF glasses cohort for 5 work days
  - 5 residents in non-BLF glasses (sham) cohort for 5 works days
- Residents completed daily questionnaire including 16-item Computer Vision (CVS-Q, Likert scale 1-5), and Swedish Occupational Fatigue Index (SOFI, 16 questions, Likert scale 0-10)

Sample BLF pair

Results

- 10 Radiology residents (8 PGY-2, 1 PGY-3, and 1 PGY-4)
- 6 females and 4 males
- 32 symptoms measured, no statistical significant variables, however:
  - 11/16 (68.6%) symptoms measured on CVS-Q reduced in BLF cohort
  - 13/16 (81.3%) symptoms measured on SOFI were reduced in BLF cohort
- Two symptoms showed nearly statistically significant reduction in BLF cohort:
  - "Drowsy" $p = 0.057$
  - "Lack of concern" $p = 0.075$

Conclusion

- Although no statistical significance, there appears to be a **trend favoring BLF glasses in reducing the majority of CVS and occupational fatigue symptoms**
- Limitations include small sample size and lack of diversification of participants, and true blinding of residents was impossible secondary to close working quarters
- Future research with larger sample sizes and participants of different ages are required to further elucidate the potential role of BLF glasses in the radiology reading room to reduce CVS symptoms and fatigue

Take Home Points

- Data are insufficient to draw conclusions regarding effectiveness of commercially available BLF glasses
- We recommend adherence to the American Academy of Ophthalmologists "eye ergonomic tips" for those prone to CVS[7]:
  - 20-20-20 Rule
    - Every 20 minutes, shift eyes to look at an object at least 20 feet away for 20 seconds
  - Sit about 25 inches away from the computer screen
  - Tilt the computer screen slightly downward
  - Reduce screen glare
  - Ensure the digital screen is not much brighter than surrounding light
  - Increase frequency of breaks (microbreaks) which reduces CVS symptoms while maintaining productivity[8,9]

References

1. The Associated Press. Americans use media for almost 11 hours a day, study finds. The Denver Post. https://www.denverpost.com/2016/06/29/media-use-america-11-hours/. Published 2016. Accessed April 18, 2019.
2. American Optometric Association. Computer Vision Syndrome. American Academy of Ophthalmology. https://www.aoa.org/patients-and-public/caring-for-your-vision/protecting-your-vision/computer-vision-syndrome. Accessed May 8, 2019.
3. Sheppard AL, Wolffsohn JS. Digital eye strain: prevalence, measurement and amelioration. *BMJ open Ophthalmol*. 2018;3(1):e000146. doi:10.1136/bmjophth-2018-000146
4. Charpe NA, Kaushik V. Computer Vision Syndrome (CVS): Recognition and Control in Software Professionals. *J Hum Ecol*. 2017. doi:10.1080/09709274.2009.11906219
5. The Vision Council. Digital Eye Strain | The Vision Council. https://www.thevisioncouncil.org/content/digital-eye-strain. Accessed April 18, 2019.
6. Seguí MDM, Cabrero-García J, Crespo A, Verdú J, Ronda E. A reliable and valid questionnaire was developed to measure computer vision syndrome at the workplace. *J Clin Epidemiol*. 2015. doi:10.1016/j.jclinepi.2015.01.015
7. Computers, Digital Devices and Eye Strain - American Academy of Ophthalmology. American Academy of Ophthalmology. https://www.aao.org/eye-health/tips-prevention/computer-usage. Published 2016. Accessed April 20, 2019.
8. McLean L, Tingley M, Scott RN, Rickards J. Computer terminal work and the benefit of microbreaks. *Appl Ergon*. 2001;32(3):225-237. doi:10.1016/S0003-6870(00)00071-5
9. Galinsky T, Swanson N, Sauter S, Dunkin R, Hurrell J, Schleifer L. Supplementary breaks and stretching exercises for data entry operators: A follow-up field study. *Am J Ind Med*. 2007;50(7):519-527. doi:10.1002/ajim.20472