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

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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
- Sequelae of CVS can extend beyond the physical eye symptoms and can negatively affect both quality of life and work productivity
- CVS is reported in nearly 70% of all computer users
- A 16-item questionnaire was developed and validated to measure extent of symptoms:
  - Burning
  - Itching
  - Feeling of a foreign body
  - Tearing
  - Excessive blinking
  - Eye redness
  - Eye pain
  - Heavy eyelids
  - Dryness
  - Blurred vision
  - Double vision
  - Difficulty focusing for near vision
  - Increased sensitivity to light
  - Colored halos around objects
  - Feeling that sight is worsening
  - Headache
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.
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\(^8,9\)


