Original Article

# Headache Caused by Blue Light Control Glasses: A Case Series

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## Abstract

**Purpose:** To explores a potential link between blue light control lenses and headache onset in individuals with otherwise normal ophthalmologic findings.
**Patients and Methods:** Four patients who presented with headaches associated exclusively with wearing prescription glasses equipped with blue light control coatings are presented in this case series manuscript. We performed comprehensive ophthalmologic evaluations, including objective and subjective refraction, accommodation, vergence, intraocular pressure, and frame adjustments, but we failed to identify alternative causes for their headache.
**Results:** All patients reported headache relief following the change of the blue light control coating spectacles with normal lens spectacles, with sustained improvement during follow-up.
**Conclusion:** It is essential to alert prescribers of blue light control glasses that these glasses may cause headaches in some patients. Factors like sleep quality and the lighting in patients' home and workplace can play a role in causing these headaches. More research is needed to understand how blue light control glasses might cause headaches.

**Keywords:** Blue Light Control Glasses; Headache; Refractive Error; Visual Discomfort; Melatonin.

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## Introduction

Refractive errors (REs) are defined as defects in focusing light on the retina, resulting in blurred vision [1]. If not corrected optically or surgically, these disorders can significantly impact an individual's quality of life (QOL) [2]. Although refractive errors often begin in early childhood, they can affect a person's activities for many years [3]. REs are highly prevalent globally, particularly in Asia, and, if left uncorrected, can be considered one of the leading causes of vision loss [4]. However, refractive errors can usually be easily corrected with glasses, contact lenses, or refractive surgeries. Failure to diagnose and provide proper correction can lead to visual impairment and severe economic and social consequences [5].

Blue light, with a shorter wavelength compared to other visible wavelengths, has higher photochemical energy and can induce cellular apoptosis [6, 7]. The potential toxicity of blue light has prompted many lens manufacturers and opticians to favor blue light-filtering lenses. Blue light-filtering coatings are a group of treatments that, in addition to reducing excess surface reflections and blocking ultraviolet light, also eliminate high-energy visible light in the blue, indigo, and violet spectrum [8].

Here we report four cases where individuals, despite having appropriately prescribed glasses and no other identifiable cause for headache, experienced headaches cased by blue control lenses. This study adhered to the tenets of the Declaration of Helsinki and was approved by the institutional ethics committee. Informed consent was obtained from all patients prior to reporting their cases.

## Case 1

A 28-year-old man presented with complaints of headache occurring only while using glasses with blue coating. His medical history revealed no prior incidents of headache, and consultations with relevant physicians found no justifiable cause. The patient reported headache exclusively associated with wearing glasses, suggesting a potential link to visual or optical issues. Objective and subjective refraction, with and without cycloplegia, were performed. Cover testing and assessments of accommodation and vergence were conducted (Table 1), and intraocular pressure was checked.

Since the patient's prescription was consistent with subjective findings and previous glasses, and no differences in pupillary distance (PD) or accommodative and vergence issues were observed, a change in the glasses frame was suggested. However, this did not alleviate the symptoms. Subsequently, we modified the lens blue light control coating, after which the patient reported symptom relief and comfort during a 6-month follow-up period.

## Case 2

An 18-year-old woman presented with complaints of headache over the preceding two weeks. Her medical history showed no prior incidents of headache. The headaches were localized in the forehead, and consultations with related physicians found no justifiable cause. The patient reported headache exclusively associated with her new glasses, suggesting a potential connection to visual or optical factors.

Objective and subjective refraction, with and without cycloplegia, were performed. Cover testing and assessments of accommodation and vergence were conducted (Table 1), and intraocular pressure was checked. Given that initial adjustment issues with new glasses

are common, we reduced the prescription by 0.25 diopters. However, after two weeks, the symptoms persisted.

As the headaches were exacerbated solely by wearing the glasses, we considered changing the frame, but this did not improve the symptoms. Finally, we replaced the blue light control coating on the lenses, after which the patient reported symptom relief and comfort during the follow-up period.

### Case 3

A 42-year-old woman presented for presbyopia management and later complained of headaches while using her near glasses. After confirming the accuracy of her subjective refraction, cover testing and assessments of accommodation and vergence were performed (Table 1), and also her intraocular pressure was checked. As no identifiable cause for the headache was found and the patient reported headaches exclusively when wearing the glasses, we drew on previous similar experiences. This time, we directly changed the blue light control coating on the lenses without altering the prescription. The patient reported symptom relief and comfort during the follow-up period.

### Case 4

A 32-year-old man visited our optometry center to select a new frame for his glasses and ordered lenses with blue light control lenses made based on his previous prescription. Two weeks later, he reported experiencing headaches while wearing the new glasses. After confirming the accuracy of the prescription and fabrication of the current glasses, as well as the complete similarity between the old and new frames, cover testing and assessments of accommodation and vergence were performed (Table 1), and his intraocular pressure was checked. Consultations with related physicians found no identifiable cause for the headaches. The patient consistently reported headaches only while wearing the new glasses. Based on previous cases with similar symptoms, we decided to change the blue light control coating on the lenses without altering the prescription. During the follow-up visit, the patient reported that his symptoms had improved, and he felt more comfortable while wearing the glasses.

## Discussion

Approximately half of the adult population worldwide experiences headaches. The classification and diagnostic criteria provided by the International Headache Society can assist physicians in distinguishing between primary headaches (such as tension, migraine, and cluster headaches) and secondary headaches (such as those caused by infections or visual issues) [9]. A thorough medical history and physical examination can significantly help identify the underlying cause of headaches [10]. Some headaches, such as migraines, have ocular symptoms, while certain eye conditions, including refractive errors, presbyopia, accommodative and vergence disorders, and increased intraocular pressure, can also lead to headache [10].

In this study, we encountered a few specific cases of headache triggered by the use of prescription glasses, despite no identifiable justification in the eyes or visual system. A common feature among these cases was sensitivity to blue light control filters. These filters block the blue light spectrum [8]. Based on previous evidence, blue light affects melatonin levels and sleep quality. Furthermore, previous studies have demonstrated that the use of blue

**Table 1:** Demographic findings of four cases entering the study

| Case | | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| Age/gender | | | 28/M | 18/F | 42/F | 32/M |
| Visual acuity without correction (Decimal) | RE | | 4/10 | 6/10 | 10/10 | 9/10 |
| | LE | | 4/10 | 6/10 | 10/10 | 10/10 |
| Visual acuity with correction (Decimal) | RE | | 10/10 | 10/10 | 10/10 | 10/10 |
| | LE | | 10/10 | 10/10 | 10/10 | 10/10 |
| Present glasses | RE | | - 2.50/- 0.50*180 | - 1.50 SPH | - | - 0.25- 1.00*93 |
| | LE | | - 2.25/- 1.00*180 | - 1.50 SPH | - | + 0.25- 0.25*39 |
| Objective refraction (dry) | RE | | - 2.50/- 0.75*180 | - 1.75 SPH | PL | - 0.25- 1.00*93 |
| | LE | | - 2.50/- 1.00*180 | - 1.75 SPH | PL | + 0.25- 0.25*39 |
| Objective refraction (cyclo) | RE | | - 2.50/- 0.50*180 | - 1.50 SPH | + 0.25 | PL-1.00*93 |
| | LE | | - 2.25/- 1.00*180 | - 1.50 SPH | + 0.25 | + 0.75- 0.25*39 |
| Subjective acceptance | RE | | - 2.50/- 0.50*180 | - 1.50 SPH | + 1.00 | - 0.25- 1.00*93 |
| | LE | | - 2.25/- 1.00*180 | - 1.50 SPH | + 1.00 | + 0.25- 0.25*39 |
| Accommodation NPA (cm)/facility ± 2/Lag with MEM | RE | | 6/15/ + 0.75 | 6/18/ + 0.50 | 20/8/+ 1.50 | 7/19/+ 0.75 |
| | LE | | 6/15/ + 0.75 | 6/18/ + 0.50 | 20/8/+ 1.50 | 7/19/+ 0.75 |
| | Binocular | | 8/14/ + 0.5 | 6/17/ + 0.50 | 20/8/+ 1.50 | 7/19/+ 0.75 |
| Cover test | Without correction | far | ortho | ortho | ortho | ortho |
| | | near | 2exo | ortho | 6exo | ortho |
| | With correction | far | ortho | ortho | ortho | ortho |
| | | near | 2exo | ortho | 6exo | ortho |
| Vergence NPC (cm)/ NFV (Break/ Recovery Distance)/ NFV (Break/Recovery near) | | | 8 (far7/4) (near 13/10) | 6 (far8/6) (near 15/13) | 7 (far8/6) (near 15/13) | 8 (far10/8) (near 114/12) |
| PFV (Break/Recovery Distance)/ PFV (Break/Recovery near) | | | far (14/9) near (19/14) | far (14/9) near (20/16) | far (14/9) near (16/12) | far (14/9) near (20/18) |
| IOP | RE | | 15 | 15 | 14 | 14 |
| | LE | | 15 | 15 | 14 | 14 |

RE: Right Eye; LE: Left EYE; IOP: Intraocular Pressure; NPA: Near Point Accommodation; NPC: Near Point of Convergence; NFV: Negative Fusional Vergence; PFV: Positive Fusional Vergence; MEM: Monocular estimation method; SPH: Sphere; PL: Plano; M: Male; F: Female

light blocking glasses might alter melatonin levels and disrupt sleep [11-13]. It can be suggested that these headaches after using blue light control glasses might be caused by changes in melatonin or alterations in the sleep patterns of these individuals. Headaches caused by changes in melatonin and those resulting from sleep disturbances have also been reported previously [14-15].

## Conclusion

It is essential to alert prescribers of blue light control glasses that these glasses may cause headaches in some patients. Factors like sleep quality and the lighting in patients' home and workplace can play a role in causing these headaches. More research is needed to understand how blue light control glasses might cause headaches.

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## References

1. Worku S, Getachew T, Nagarchi K, Shewangizaw M. The Magnitude of Refractive Error and Its Associated Factors Among Patients Visiting Ophthalmology Clinics in Southern Ethiopia, 2022. Clin Ophthalmol. 2023 23;17:1801-11.
2. Hsieh MH, Lin JC. Association of refractive error with vision-related quality of life in junior high school students. Taiwan J Ophthalmol. 2016;6(1):32-5.
3. Kandel H, Khadka J, Goggin M, Pesudovs K. Impact of refractive error on quality of life: a qualitative study. Clin Exp Ophthalmol. 2017;45(7):677-88.
4. GBD 2019 Blindness and Vision Impairment Collaborators; Vision Loss Expert Group of the Global Burden of Disease Study. Trends in prevalence of blindness and distance and near vision impairment over 30 years: an analysis for the Global Burden of Disease Study. Lancet Glob Health. 2021;9(2):e130-43.
5. Schiefer U, Kraus C, Baumbach P, Ungewiß J, Michels R. Refractive errors. Dtsch Arztebl Int. 2016;113(41):693-702.
6. Lee HS, Cui L, Li Y, Choi JS, Choi JH, Li Z, et al. Influence of Light Emitting Diode-Derived Blue Light Overexposure on Mouse Ocular Surface. PLoS One. 2016;11(8):e0161041.
7. Youssef PN, Sheibani N, Albert DM. Retinal light toxicity. Eye (Lond). 2011;25(1):1-14.
8. Park JW, Choi CY. Comparative Spectrophotometer Analysis of Ultraviolet-light Filtering, Blue-light Filtering, and Violet-light Filtering Intraocular Lenses. Korean J Ophthalmol. 2022;36(1):1-5.
9. Hainer BL, Matheson EM. Approach to acute headache in adults. Am Fam Physician. 2013;87(10):682-7.
10. Baraness L, Baker AM. Acute Headache. 2023 Jul 26. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
11. Ostrin LA. Ocular and systemic melatonin and the influence of light exposure. Clin Exp Optom. 2019;102(2):99-108.
12. Wahl S, Engelhardt M, Schaupp P, Lappe C, Ivanov IV. The inner clock-Blue light sets the human rhythm. J Biophotonics. 2019;12(12):e201900102.
13. van der Lely S, Frey S, Garbazza C, Wirz-Justice A, Jenni OG, Steiner R, et al. Blue blocker glasses as a countermeasure for alerting effects of evening light-emitting diode screen exposure in male teenagers. J Adolesc Health. 2015;56(1):113-9.

14. Peres MF. Melatonin, the pineal gland and their implications for headache disorders. Cephalalgia. 2005;25(6):403-11.
15. Ferini-Strambi L, Galbiati A, Combi R. Sleep disorder-related headaches. Neurol Sci. 2019;40(Suppl 1):107-13.

**Footnotes and Financial Disclosures**

**Conflict of interest:**

The authors have no conflict of interest with the subject matter of the present manuscript.