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# Photokeratitis among Medical Staff after Exposure to UV Light Germicidal Lamps in Queen Alia Military Hospital in Covid-19 Time

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***Abstract***— ***Aim****: to evaluate cases of photokeratitis which occurred after exposure to UV light germicidal lamps.* ***Method****: this retrospective study was conducted at the ophthalmology clinic of queen Alia Military Hospital between April 2020 and January 2021. After using UV light germicidal lamps at queen Alia Military Hospital in covid-19 time cases of photokeratitis among medical staff were noted. The medical records of those patients were reviewed regarding age, gender, medical history, ocular symptoms and outcome of medical treatment. The outcome of ocular examination at presentation and after treatment were recorded. The obtained data was analyzed.* ***Results****: Twenty patients aged between 30 and 35 years (mean 33±1.1 years). 75% of them were females. The main time interval between exposure and onset of symptoms was eight hours. The most common presenting symptoms were pain and tearing. On the other hand, conjunctival injection and punctate corneal erosions were the most common findings at presentation. Dramatic improvement occurred on the 3rd day post treatment and completed resolution of signs and symptoms was achieved by the 7th day without any sequalae.* ***Conclusion****: There are many simple precautions that medical personnel can take to limit exposure to UV radiation such as spending short time as little as possible in environments with intensive UV radiation using goggles, UV-protective hydrogel or hard gas permeable contact lenses, and sunglasses and avoid looking diirectly at the UV light emitting devices. More over the inspection of lighting systems in public areas and the legislative regulation of this issue are of great importance.*

***Keywords***— *Photokeratitis, ultra violet light*.

## I. Introduction

Ultraviolet (UV) radiation with a range between 200 and 400 nm, that comprises the three types of wavelengths UV-A, UV-B and UV-C, has a beneficial and in the same time; a harmful effect on the human body.[1]The relation between UV radiation exposure and the eyelid cancers basal cell carcinoma and squamous cell carcinoma, photokeratitis, pterygium and cataract development has been found. [2]

Photokeratitis is a pathological condition that is characterized by damage to the corneal epithelium due to exposure to UV light from natural or artificial sources.[3] frequently is due to an occupational related disease, and symptoms including photophobia, foreign body sensation, tearing and blurring of the vision typically appear after 4 to 12 hours after UV light exposure. Clinical signs that characterize this condition are: conjunctival injection and areas of punctate erosion in the corneal epithelium, especially in the interpalpebral zone. It usually resolves within 24 to 48 hours. [4] Furthermore, cases of photokeratitis development due to the lighting used in sporty gymnasiums and theaters have been reported.[5] The aim of this study is to evaluate the patterns and outcomes of UV photokeratitis after exposure to UV light.

## II. Materials and Methods

This retrospective study was conducted at the ophthalmology clinic of queen Alia Military Hospital between April 2020 and January 2021. After using UV light germicidal lamps at queen Alia Military Hospital in covid-19 time cases of photokeratitis among medical staff were noted. The medical records of those patients were reviewed regarding age, gender, medical history, ocular symptoms and outcome of medical treatment. The diagnosis was made after full history and physical examination by an ophthalmology consultant and tow specialist using cobalt-blue light after staining with fluorescein. All cases were treated with topical antibiotics and lubricant eye drops The outcome of ocular examination at presentation and after treatment were recorded. The obtained data was analyzed.

## III. Results

Twenty patients aged between 30 and 35 years (mean 33±1.1 years). 75% of them were females. The presenting symptoms and time interval between exposure and onset of symptoms in relation to gender are summarized in table 1.

Conjunctival injection and corneal punctate epithelial erosions (PES) were the most common finding observed in both eyes. On fundus examination, no pathology was observed in the vitreous, posterior pole or peripheral retina. All cases were treated with topical antibiotics and lubricant eye drops.



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TABLE 1. The presenting symptoms and time interval between exposure and onset of symptoms in relation to gender

| | Males (5 patients) | Females (15 patients) |
|---|---|---|
| **Durations (hrs.)** | 8.1 | 7.9 |
| **Bilateral** | 5 (100%) | 15 (100%) |
| **Pain** | 5 (100%) | 15 (100%) |
| **tearing** | 4 (80.0%) | 13 (86.7%) |
| **Foreign body sensation** | 4 (80.0%) | 12 (80.0% |
| **photophobia** | 3 (60.0%) | 11 (73.3%) |
| **Blurring of vision** | 2 (40.0%) | 7 (46.7%) |

The outcome of ocular examination at presentation and at 3 and 7 days post treatment are summarized in table 2.

TABLE 2. The outcome of ocular symptoms and findings at presentation and at 3 and 7 days post treatment.

| | At presentation | At 3 days post treatment | At 7 days post treatment |
|---|---|---|---|
| **Pain** | 20 (100%) | 4 (20.0%) | 0 (0.0%) |
| **tearing** | 17 (85.0%) | 3 (15.0%) | 0 (0.0%) |
| **Foreign body sensation** | 16 (80.0%) | 5 (25.0%) | 0 (0.0%) |
| **photophobia** | 14 (70.0%) | 1 (5.0%) | 0 (0.0%) |
| **Blurring of vision** | 9 (45.0%) | 0 (0.0%) | 0 (0.0%) |
| **Conjunctival Injection** | 20 (100%) | 0 (0.0%) | 0 (0.0%) |
| **PES** | 20 (100%) | 5 (20.0%) | 0 (0.0%) |

## IV. Discussion

Photokeratitis is defined as a painful ocular condition which can develop after unprotected exposure to Ultraviolet (UV) rays. The Ultraviolet rays which have a variety of sources including welding arcs, reflections off snow, and germicidal UV lamps can cause damage to the corneal epithelial cells and cause them to slough off after several hours. [6] In this condition the underlying corneal nerves are left exposed and damaged, causing symptoms of intense pain, photophobia, and foreign body sensation. The cornea transmits light in the visible spectrum with a range from 400nm to 700nm, but will absorb light in the Ultraviolet spectrum from 10 nm to 400 nm. Many animal studies have shown that corneal epithelium absorbs almost 100% of UV light below 290nm (UV-C range). [7]This epithelial UV absorption has a protective function for the underlying stroma and endothelium, but excessive causes damage and apoptosis which results in delayed sloughing of the epithelium.[8] The reason photokeratitis is considered as a painful condition is because the epithelium is preferentially damaged and sheds, leaving the underlying sub-epithelial nerve plexus exposed.[9] Due to the possible risks and necessity of protection against UV exposure, especially for medical personnel and patients, it is emphasized the use of glasses or contact lens that attenuate the effects of UV light is recommended in the USA.[10]

If the wavelength is sufficiently powerful, as in an ultraviolet laser device, it can also reach the lens. Superficial punctate keratitis frequently may develop. Although direct thermal damage has no latency period between exposure and the onset of symptoms, in our study there was a latency period between UV ray's exposure and the onset of symptoms with a period of 3 to 4 hours. Corneal epithelium cell necrosis begins most of the times 2 to 3 hours after exposure and subsequently blinking leads to fragmentation and results in clinical symptom onset.

## V. Conclusion

There are many simple precautions that medical personnel can take to limit exposure to UV radiation such as spending short time as little as possible in environments with intensive UV radiation using goggles, UV-protective hydrogel or hard gas permeable contact lenses, and sunglasses and avoid looking directly at the UV light emitting devices. More over the inspection of lighting systems in public areas and the legislative regulation of this issue are of great importance.

## References

[1] GUPTA, Asheesh, et al. Ultraviolet radiation in wound care: sterilization and stimulation. Advances in wound care, 2013, 2.8: 422-437.
[2] Behar-Cohen, Francine, et al. "Ultraviolet damage to the eye revisited: eye-sun protection factor (E-SPF®), a new ultraviolet protection label for eyewear." Clinical ophthalmology (Auckland, NZ) 8 (2014): 87.
[3] Cullen, Anthony P. "Photokeratitis and other phototoxic effects on the cornea and conjunctiva." International journal of toxicology 21.6 (2002): 455-464.
[4] Kirschke, David L., et al. "Photokeratitis and UV-radiation burns associated with damaged metal halide lamps." Archives of pediatrics & adolescent medicine 158.4 (2004): 372-376.
[5] Rubeshkumar, Polani Chandrasekar, et al. "An outbreak of bilateral photokeratitis among an indoor school event attendees attributable to unshielded mercury vapour and metal halide lights, Eruvadi village, Tirunelveli, Tamil Nadu, South India, 2018." Clinical Epidemiology and Global Health 7.4 (2019): 680-683.
[6] Izadi, M., et al. "Photokeratitis induced by ultraviolet radiation in travelers: A major health problem." Journal of Postgraduate Medicine 64.1 (2018): 40.
[7] Doutch, James J., et al. "Ultraviolet light transmission through the human corneal stroma is reduced in the periphery." Biophysical journal 102.6 (2012): 1258-1264.
[8] Mergler, Stefan, and Uwe Pleyer. "The human corneal endothelium: new insights into electrophysiology and ion channels." Progress in retinal and eye research 26.4 (2007): 359-378.
[9] Stepp, Mary Ann, et al. "Corneal epithelial cells function as surrogate Schwann cells for their sensory nerves." Glia 65.6 (2017): 851-863.
[10] Hartnett, Pamela D., and Catherine O'Keefe. "Improving skin cancer knowledge among nurse practitioners." Journal of the Dermatology Nurses' Association 8.2 (2016): 123-128.



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