Antifogging Measures for Protective Eyewear

Bharti Sachdeva[1], Parul Saini[1]

[1]*Assistant Professor, Faculty of Nursing, SGT University, Gurugram*

Abstract

Fogging of protective eyewear is commonly encountered by healthcare workers and there exists a number of ways to combat this. This article presents a comparison various anti-fogging measures of protective eyewear in terms of their mechanism of action, advantages and disadvantages.

Keywords*: Fogging, Misting, Condensation, Anti-fogging, Protective eyewear*

Introduction

Coronavirus disease (COVID-19) is an infectious disease caused by SARS-CoV-2 Virus. It can cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). COVID-19 outbreak has severely abolished the world's health, economics and social progress. In India, over 10.8 million confirmed COVID-19 cases and more than 1, 55,000 deaths have been reported as of 11th February, 2021 [1]. COVID-19 predominantly spreads by contact, droplet or airborne transmission necessitating the use personal protective equipment (PPE) to prevent cross infection. Before we understand the use of Protective eyewear and the challenges associated with it, let's first explore the mode of SARS-CoV-2 viral transmission.

Mode of viral transmission

Droplet transmission generally occurs via larger respiratory particles which tend to settle down and travel not more than one meter. Once the virus settles on a surface, it remains there for a no. of hours or possibly days and becomes the source of potential infection to the ones who come in contact with these. Although the SARS-CoV-2 is not considered to be airborne but the risk is associated with production of smaller respiratory particles during certain procedures such as endo-tracheal intubation and cardiac compressions. These smaller particles remain suspended in air for longer and can travel distances more than two meters. Thus the use of PPEs needs to be at par with the level of contact, droplet and airborne transmission [1].

Therefore, the challenge arises where both mask and eyewear are required and that is fogged up eyewear [2]. It happens on escaping of warm exhaled air through ridge of the mask and accumulating on the eyewear. This commonly occurring but rather risky phenomenon interested the authors to compiling the data on various antifogging measures. We started with interviewing our nursing officers at SGT Hospital, Gurugram and observed that the fogging of goggles was a great occupational health hazard. As the healthcare workers tend to remove the protective eyewear once it is mistified, putting at risk the safety of their own as well as their patients. In order to support healthcare workers overcome this problem, wedecided to retrieve the existing data on anti-fogging measures. We performed an extensive search on PubMed using keywords 'anti-fogging of eyewear', 'fogging of protective eyewear', 'fogging and eyewear', 'misting of eyewear', 'condensation of eyewear', 'anti-fogging measures'. The search displayed 12 results that were relevant to the purpose of study.

Corresponding author:
Bharti Sachdeva
E-mail ID: bharti.nursing@sgtuniversity.org

We concised the findings of our study as under:

1. Tightly sealing the mask against nasal ridge by crossing over the ear loops or mask ties, by pressing nasal rim hard, by putting on adhesive tape over the junction of mask and nasal ridge [2]. A tight seal blocks the exhaled air escaping from superior margin of the mask and thus prevents it from accumulating on the eyewear. It is the most convenient and practical option but tight seal may cause face marks and may be uneasy to wear for long. Adhesive tape may cause skin irritation, if hypoallergenic one is not used.

2. Applying soap-water solution [3,4,5,7-9]: Soap is a good surfactant, known to reduce surface tension. The reduced surface evenly spreads out water vapors and prevents fogging. It is cost-effective and suitable for low resource areas but may distort the vision, if not wiped adequately.

3. Alcohol based sanitizer [3, 4, 7]: Alcohol is believed to decrease scattering of light. It is readily available in good resource settings. The down side is that alcohol may be irritating to eyes causing burning sensation, may cause complications in some cases such as conjunctivitis, keratitis and rarely corneal scarring.

4. Anti-fogging sprays or gels [3, 4, 7]: It works on the same principle as that of soap by decreasing surface tension and spreading of water molecules to prevent scattering of light. These are commercially available surfactants exclusively meant for anti-fogging of eyeglasses, goggles or wind shields. Their use is limited in healthcare settings due to cost constraint.

5. Filtered eye mask [4]: Since it is airtight, it prevents fogging and also gives a good protection against COVID-19 infection.

6. Iodophor [3, 7]: These are iodine based substances which are readily available but they take longer (approx. 10 minutes) to dry and leave yellow stain on eyewear.

7. Application of hydrogel patches on the upper surface of mask [9]: These are better than other measures for achieving a tight fit without compromising the comfort.

Conclusion

As the COVID-19 cases continue to rise across the world, wearing mask and protective eyewear is going to stay in practice for uncertain times. This article provides a range of antifogging measures to choose from; in terms of cost, availability, feasibility and comfort.

Ethical Clearance: NA

Source of Funding: Self

Conflict of Interest: Nil

References

1. Statista. Cumulative of the coronavirus (COVID-19) confirmed, recovered and deceased numbers across India from January 29, 2020 to March 25, 2021. Weblog. [Online] Available from: https://www.statista.com/statistics/1104054/india-coronavirus-covid-19-daily-confirmed-recovered-death-cases/ [Accessed 28 March 2021].
2. Cook TM. Personal protective equipment during the coronavirus disease (COVID) 2019 pandemic–a narrative review. Anaesthesia. 2020 Jul; 75(7):920-7.
3. Vered Hazanchuk. How to Wear a Face Mask without Fogging Your Glasses; American academy of ophthalmology. Retrieved from: https://www.aao.org/eye-health/tips-prevention/face-mask-foggy-glasses-coronavirus-covid
4. Hu Y, Wang L, Hu S. Prevention of fogging of protective eyewear for medical staff during the COVID-19 pandemic. Journal of Emergency Nursing. 2020 Sep.
5. Madan M, Malhotra N, Gupta N, Ish S, Ish P. Fogging of goggles in PPE during COVID-19 pandemic. A practical problem with multiple possible solutions. Advances in Respiratory Medicine. 2020; 88(6): 636-7.
6. Kumar A, Qureshi OA, Arora R, Kumar S, Jameel J, Khan R. Comparison of three low-cost techniques to control fogging of sealed eyewear in a simulated operating room environment: A preliminary analysis. Journal of Clinical Orthopaedics and Trauma. 2020 Oct 1; 11:S696-9.
7. Malik SS, Malik SS. A simple method to prevent

spectacle lenses misting up on wearing a face mask. The Annals of The Royal College of Surgeons of England. 2011 Mar; 93(2):168

8. Zhou N, Suo H, Alamgir M, Li Y, Yang J, Yang L, An X, Zhang Y, Lan J, Zhang L, Zhu J. Application of hydrogel patches to the upper margins of N95 respirators as a novel antifog measure for goggles: A prospective, self-controlled study. Journal of the American Academy of Dermatology. 2020 Nov 1; 83(5):1539-41.