



IMPACT OF N 95 MASKS ON QUALITY OF VISION IN SPECTACLE USERS

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ABSTRACT **Introduction:** wearing masks for a prolonged amount of time can decrease work efficiency by causing a host of physiological or psychological problems. The use of masks, in particular, for extended periods of time causes physical adverse effects such as difficulty breathing, mask-induced acne, rashes, headache and sometimes, impaired cognition.

Objectives: To assess the impact of using N95 masks by a part of the population using spectacles.

Materials and Methods: After taking informed consent, 270 spectacles and mask users were enrolled for this single centre, questionnaire based, cross-sectional observational study.

Results: A large proportion (70.2%) of the respondents complained of fogging of spectacle lens on wearing N95 masks which impaired their vision to variable extent and also impaired the daily activity.

Conclusion: This study identified the impact of N95 masks on quality of vision in spectacle users and various recommendations are presented for prevention and management of these adverse effects.

KEYWORDS : Spectacle User, Impaired Vision, Fogging

INTRODUCTION

The first case of COVID-19 was seen in the New York City, after which this novel coronavirus, referred to as SARS-COV 2, within a short amount of time, spread all over the world, ultimately causing the World Health Organization to officially announce it as an infectious disease pandemic on January 30, 2020.¹

Droplet infection was the main mode of infection, mandating the general public and especially the healthcare professionals to wear personal protective equipment (PPE) for extended periods to avoid the risk of infection to themselves and others.¹

PPE includes all protective gear in the form of gowns, gloves, masks, and face shields. In spite of having a number of advantages, PPE comes with its own plethora of adverse effects due to prolonged usage.¹ It has been seen that wearing masks for a prolonged amount of time can decrease work efficiency by causing a host of physiological or psychological problems. The use of masks, in particular, for extended periods of time causes physical adverse effects such as difficulty breathing, mask-induced acne, rashes, headache and sometimes, impaired cognition. It also interferes with vision, communication, and thermal equilibrium.²

Of all the ocular complaints, refractive errors is the most common entity affecting people of all the age groups and the most common cause of visual impairment according to WHO and other recent studies.³

With surgeons now wearing both masks and face shields to protect against COVID-19, fogging seems to be one of the major issues. Despite brisk and extensive developments in ocular surgery, surgeons continue to face the problem of recurrent fogging of their spectacles and microscope eyepieces, for clear viewing of the structures while performing surgery.⁴

This has emphasized the need to keep the surfaces devoid of fogging. Fogging over the lens occurs due to an imbalance between the temperature of the eyepiece, airway cavity, and relative humidity of the environment resulting in condensation of small water droplets over the lens.⁵

The exhaled air from the mask tries to escape either in the upward or downward direction, but most of it is pushed upwards where it gets into contact with the spectacle lens. The misting occurs due to the warm water vapour condensing over the cooler surface of the lens, thus forming tiny water droplets that reduce the ability of the lens to transmit contrast by scattering the light.⁶

All these issues faced by people using spectacles necessitate the

researcher to find a solution to fogging, albeit temporary, to reach the maximum efficacy of a person.

MATERIALS AND METHODS

This was a 2 month cross-sectional observational study which included 270 spectacle users who were using N95 masks regularly. Patients were required to fill up a questionnaire which was specifically designed to cater the objectives of the study. The study was conducted from November 2020 to December 2020. Approval from the institutional ethics committee was obtained.

A total of 270 people fulfilling the inclusion and exclusion criteria were included in the study.

Inclusion Criteria:

Spectacle users for 1 year or more, indications being myopia, hypermetropia, astigmatism and presbyopia.

Exclusion Criteria:

- 1) Irregular use of spectacles
- 2) Irregular use of masks
- 3) Best corrected visual acuity less than 6/60 and N 12

Methodology:

A total of 236 spectacle users fulfilling the inclusion and exclusion criteria will be included in the study. An informed consent will be taken at the start of the questionnaire.

Analysis & Statistical Methods

Data was entered into Microsoft excel data sheet and analyzed using SPSS 22 version software (IBM SPSS Statistics, Somers NY, USA). Percentage of users with visual acuity & quality deterioration and percentage of users removing mask due to fogging will be calculated.

RESULTS

The study included 272 respondents who agreed to participate in the study. Respondents were from either gender, with the majority (56.3%) being males and the rest 43.7% were females. Majority of the respondents were in their 3rd decade of life, followed by people from 4th, 5th and 6th decade.

Majority of the respondents were skilled workers requiring a certain sort of precision in the field work, while others also included semi-skilled and unskilled workers in the minority.

Out of 272 respondents, 77.2% of the respondents agreed to using spectacles daily and 79.8% said they were using N95 masks on a regular basis. 63.2% were using both spectacles and N95 masks. So, in all the further analysis we will consider only these 63.2% of the respondents (i.e., 172 out of 272).

Target segment

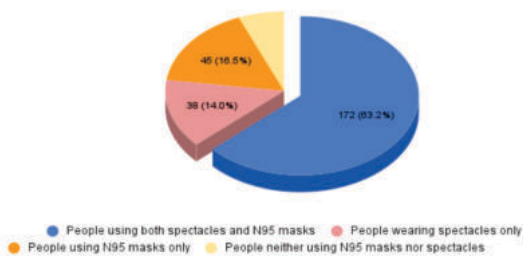


Image 1: Identifying the target segment from the sample

Out of these 136 of the respondents (i.e., 79.06%) complained of fogging of spectacle lens on wearing N95 masks which impaired their vision to variable extent.

Out of these, 102 respondents also experienced fogging of spectacles while driving which hampered their driving skills putting their lives and the lives of other road drivers and pedestrians at grave risk of any unprecedented mishap.

Solutions people prefer to clear fog on spectacles

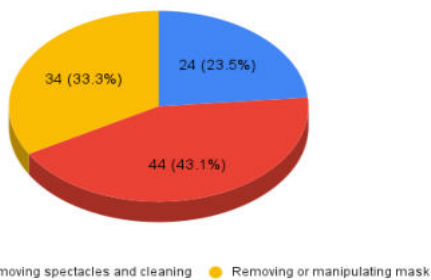


Image 2: Solutions preferred by residents

As per image 2, removing and cleaning the spectacle seemed to be the most common and convenient method to clear the fogging while some of the respondents also agreed to removing/manipulating the mask so as to reduce the fogging.

When asked about their knowledge regarding any of the methods to reduce spectacle fogging, 66.9% had no clue regarding the same.

Of the respondents who had an idea about ways to reduce fogging, the most common method used was spraying anti-fogging liquid over the lens, or using anti-fog lens. Very few respondents knew about using soap and water to clean the lens so as to avoid fogging.

DISCUSSION

Various studies have been done on the adverse effects of wearing PPE for prolonged periods. Of all the studies published, very few studies concentrate on the effects of PPE on spectacle users.

In this study, we found that irrespective of the occupation, the majority of the respondents faced trouble due to fogging in their respective fields. In particular, surgeons and drivers felt that fogging of their spectacles during operating or driving reduced their work-efficiency significantly and also put the lives of a lot of people in danger.

Thus, finding a proper or a long term solution to this problem becomes imperative.

As suggested by R Ricks in his solution to fogging, finding a particular brand of anti fogging spray may be difficult or not feasible to a large proportion of the general public. This also calls for the need to find a solution that is also cost effective and provides anti-fogging effects for a significant amount of time.

To combat this problem, B Gurnani and others came up with a simple solution of using medical grade anti-fog spray or towelettes which work by reducing the surface tension, allows formation of a uniform

film of water and improves clarity. It has an added advantage that it ensures that there are no scratches on the optical devices. It is applied with a sterilized dry cotton swab or sprayed directly onto the eyepiece and then, the eyepiece is cleaned with a sponge provided with the solution and allowed to dry. The only limitation is that it holds good for not more than 6 hours.

However, for people still not being able to procure these anti-fog spray, the easiest fix is using a mixture of soap and water to clean the spectacles. This solution seems to be at par with the anti fogging spray but can be a little messy which is why most people avoid it. Using an empty spray bottle to dispense this mixture may help tackle this messiness.

CONCLUSION

This study identified the impact of N95 masks on quality of vision in spectacle users and various recommendations are presented for prevention and management of these adverse effects.

Conflict of Interest

The author declares no conflict of interest.

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