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ASSESSMENT OF MASK ASSOCIATED DRY EYES (MADE) IN HEALTH CARE WORKERS (HCW) IN NAVI MUMBAI DURING COVID-19 PANDEMIC: A CROSS – SECTIONAL STUDY

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ABSTRACT

Background: Wearing of face masks at public places has been made compulsory since the beginning of the COVID - 19 pandemic. Continuous wearing of face mask has led to some worry with mask being considered as uncomfortable or inconvenient, continued use of mask have been associated with complaints of headache, breathing difficulty, skin irritation, sweating and fogged glasses called altogether as mask associated dry eye (MADE).

Objectives: The purpose of this study was to measure the mask associated dry eyes among the HCW (Doctors, Nurses, Paramedical staff) at one study centre.

Methods: In an observational cross - sectional clinical study, 100 healthcare workers from healthcare centres in Navi Mumbai of either sex in the age group of 20 to 45 years both inclusive, using face mask were included after obtaining written informed consent from them. After enrolment in the study, detailed history of participants was taken and they were asked to fill in the questionnaire. The individuals were assessed for the symptoms of dry eye such as soreness, scratchiness, dryness, glitziness and burning sensation. The Schirmer's test was performed by the ophthalmologists.

Results: Almost all individuals wearing mask for more than 7 hours in a day exhibit the dry eye symptoms such as soreness, scratchiness, dryness, glitziness and burning sensation with statistically

significant difference on comparison with individuals not wearing mask for more than 7 hours in a day. Schimer's test values showed that the dry eyes were experienced more by the individuals who used to wear masks continuous for more than seven hours.

Conclusion: The present observational study confirmed the presence of mask-associated dry eye (MADE), in healthcare workers and if wearing a face mask lasts longer than 7 hours per day.

Keywords: dry eye, MADE, face mask, COVID - 19

INTRODUCTION

The pandemic by COVID-19 has been a major health issue affecting people worldwide. Almost entire world has been crippled by it since December 2019 **[1]**. The novel corona virus was named as the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2, 2019-nCoV) due to its high homology (~80%) to SARS-CoV, which caused acute respiratory distress syndrome (ARDS) and high mortality during 2002–2003 **[2]**. The disease caused by corona virus was called Coronavirus disease 19 (COVID-19) and a pandemic was declared by the World Health Organization (WHO).

Wearing of face masks has become an essential part of social daily life since the beginning of the COVID - 19 pandemic **[3]**. This has led to some worry with mask being considered as uncomfortable or inconvenient, continued use of mask have been associated with complaints of headache, breathing difficulty, skin irritation, sweating and fogged glasses **[4]**. D E White, an American ophthalmologist, observed the first unreliable observation of mask associated dry eye (MADE) in June 2020 and explained this condition on his blog and coined the acronym 'MADE' **[5]**.

Dry eye disease is defined as a "multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and subacute inflammation of the ocular surface **[6]**. Dry eye is usually associated with symptoms like discomfort, burning sensation, grittiness, blurred vision, redness, itchy eyes. Common causes of dry eyes are aging, systemic disorders, Vitamin A deficiency, chronic alcoholic, wind, smoke, air conditioning, rheumatoid arthritis, etc. **[7]**.

The widespread use of face mask was suggested as key measure against the spread of SARS-CoV-2. Larger number of people reported an awareness of air blowing upward from mask into their eyes. This increased airflow likely advance the evaporation of tear film when continuous for hours or day may result in ocular surface irritation or inflammation.

Amid global COVID-19 pandemic, it was everyone's responsibility to wear a mask when going out at public places, even when having to struggle with eye dryness. The ophthalmologists as well as the public need to remain aware of the MADE. It has become need of an hour to assess the relationship between continuous use of face masks and occurrence of eye dryness to plan the preventive and curative measures accordingly.

The present study entitled "**Assessment of Mask Associated Dry eyes (MADE) in Health Care Workers (HCW) in Navi Mumbai during COVID-19 Pandemic: A Cross – Sectional Study"** was conducted by keeping all these views in mind. The purpose of this study was to measure the mask associated dry eyes among the HCW (Doctors, Nurses, Paramedical staff) at one study centre.

MATERIALS & METHODS

- **Study design, sites:**

This observational cross - sectional clinical study was carried out at D. Y. Patil deemed to be university School of Ayurveda, Nerul, Navi Mumbai – 400 706, Maharashtra state.

- **Ethical considerations:**

Ethical approval from Institutional Ethics committee (IEC) for Ph. D. research work associated with Dry Eye Symptoms was obtained. The present observational study was an extension of the same.

- **Enrolment of study participants**:

Intern students, nursing and paramedical staff of the study center and who consented freely, were considered for the study.

- **Inclusion Criteria:**

Healthcare workers from healthcare centres or hospital in Navi Mumbai of either sex in the age group of 20 to 45 years both inclusive and using face mask were included in the study. Subjects who were ready to provide written informed consent and who were ready to willingly participate and follow the protocol requirements of the clinical study were included in the study.

- **Exclusion Criteria:**

Subjects who were contact lens wearers, having prolonged use of digital device (more than 5 hours a day), suffering from glaucoma, chronic alcoholic congenital cataract, mature and hyper mature cataract, who had any other ophthalmic condition like glaucoma, diabetic retinopathy, macular degeneration, retinitis pigmentosa which required urgent and separate treatment, subjects with Uncontrolled Diabetes and Uncontrolled Hypertension, subjects taking Steroid treatment and/or any kind of immunosuppressive therapy, pregnant and lactating women were excluded from the study. Other conditions, which in the opinion of the investigators,

makes the patient unsuitable for enrolment or could interfere with his participation in the study were also excluded from the study.

- **Sample size:** A total of 100 subjects were enrolled in the cross-sectional study.
- **Preparation of a questionnaire:** A list of items was prepared based on interactions with teachers and Biostatisticians of various educational institutions. The questionnairecomprised of general information, questions regarding use of face mask and assessment of dry eye symptoms experienced by the participants along with estimation of Schirmer test values. The questionnaire was given to five ophthalmologists and five research methodology and medical statistics teachers for face validity purpose. Depending on the feedback received from the experts and respondents in pilot study, minor changes in structure and language of questions were done.
- **Plan of study:** 100 healthcare workers from the study centre were selected and were screened for inclusion criteria. After enrolment in the study, detailed history of participants was taken and they were asked to fill in the questionnaire. The patients were assessed for the symptoms of dry eye such as soreness, scratchiness, dryness, glitziness and burning sensation.The Schirmer test was performed by the ophthalmologists.

Plan for Statistical Analysis: The study data generated and collected was put to statistical analysis to reach to the final results and conclusions. The demographic data were presented in tables and graphs.The data obtained in the studies were subjected to tests of significance. The data on discrete variables have been represented as n (%) and Median (Range). The data on continuous variables have been represented as Mean ± SD. GraphPad InStat Version 4.0 (www.graphpad.com) software was used for statistical analysis of data. Kolmogrov – Smirnov test was applied to test the normality of data. Chi – Square test has been applied to discrete variables whereas Mann – Whitney test was continuous data.

RESULTS

Total 100 participants were enrolled in the present study. Their demographic details and responses obtained through the filled in questionnaires and details of clinical assessment are as follows:

Demographic details:

Out of total 100 study participants, 92 participants were below 25 years of age whereas only 08 participants were in 25 – 45 years of age with the average of 21.8 ± 1.70 years. Out of 100 participants, 79 participants were males whereas 21 were females.

About 56 participants were not using any optical correction whereas 44 participants were using optical correction such as spectacles or contact lens. Out of 100 participants, 91 participants were wearing mask for more than 7 hours in a day whereas 09 participants were not wearing mask for more than 7 hours with statistically significant difference between two groups. No study participant enrolled in the study had any systemic disorders. Out of 100 participants 33 participants had often experience of dryness of the nose, mouth, throat or chest, 60 participants had it sometimes whereas 07 participants had never experienced dryness of the nose, mouth, throat or chest.

The participants were divided into two groups as 91 participants were wearing mask for more than 7 hours in Group A whereas 09 participants were not wearing mask for more than 7 hours in Group B.

Questions associated with Dry eye symptoms:

1. **Soreness**: In Group A, 05 (5.49%) participants had no soreness, 10 (10.99%) had mild soreness, 64 (70.33%) participants experienced moderate soreness whereas 12 (13.19%) participants had severe soreness. None of the patients in Group B had experienced soreness. There was statistically significant difference in severity of soreness between two groups ($p < 0.0001$).
2. **Scratchiness**: In Group A, no participant had no scratchiness, 63 (69.23%) had got mild scratchiness, 21 (23.08%) participants experienced moderate scratchiness whereas 07 (7.69%) participants had severe scratchiness. In Group B, 07 (77.78%) participants had no scratchiness whereas 02 (22.22%) had got mild scratchiness. There was statistically significant difference in severity of scratchiness between two groups ($p < 0.0001$).
3. **Dryness of eyes**: In Group A, no participant had no dryness of eyes, 49 (53.85%) had got mild dryness, 34 (37.36%) participants experienced moderate dryness whereas 08 (08.79%) participants had severe dryness. In Group B, 07 (77.78%) participant had no dryness whereas 02 (22.22%) had got mild dryness. There was statistically significant difference in severity of dryness of eyes between two groups ($p < 0.0001$).
4. **Glitziness**: In Group A, 07 (07.69%) participants had no glitziness, 64 (70.33%) had got mild glitziness, 16 (17.58%) participants experienced moderate glitziness whereas 04 (04.40%) participants had severe glitziness. In Group B, 07 (77.78%)

participant had no glitzinesswhereas 02 (22.22%) had got mild dryness. There was statistically significant difference in severity of glitziness between two groups ($p < 0.0001$).

5. **Burning Sensation:** In Group A, no participant had no or mild burning sensation, 64 (70.33%) had got moderate burning sensation whereas 27 (29.67%) participants had severe burning sensation. In Group B, 08 (88.89%) participant had no burning sensation whereas 01 (11.11%) had got mild dryness. There was statistically significant difference in severity of burning sensation between two groups. ($p < 0.0001$)
6. **Schimer's test**: The average Schimer's test values of participants in Group A and Group B were 13.60 ± 5.85 (median = 13) and 19.72 ± 6.18 (median = 20) respectively. The difference in average Schimer's test values between two groups was statistically insignificant ($p = 0.0002$).
7. **Other Symptoms:** Out of 91 participants in Group A, 05 (05.49%) participants had these symptoms sometimes, 63 (69.23%) has often whereas 23 (25.27%) had experienced these symptoms constantly with statistically significant difference. About 12 (13.19%) participants were known to sleep with their eyes partly open which could have caused dry eyes in them. 48 (52.75%) participants had eye irritation as they wake from the sleep whereas 31 (34.07%) participants did not experience this thing. Only 23 (25.27%) participants had taken treatment for dry eyes in the past whereas 68 (74.73%) participants had not taken any treatment for dry eyes.

DISCUSSION

It has been observed in our hospital setting that there was marked increase in individuals mainly healthcare professionals complaining of dry eye symptoms which could be associated with regular use of face mask. Some studies were also beginning to find dry eye symptoms in COVID-19-positive patients **[8, 9]**. More than dry eye symptoms as a complication of the disease itself, that these findings may be partially associated with mandatory, long-term mask use in these patients. Dry eye symptoms may not be only associated with the COVID-19 only. The authorities had made it compulsory to use face masks compulsorily in public. The continuous use of mask caused evaporation of tear film leading to dry eye symptoms in the individuals. The occurrence of dry eye symptoms due to continuous use of mask has been termed as Mask Associated Dry Eye (MADE).

In present cross-sectional study, 100 healthcare professionals were enrolled in

the study after obtaining written informed consent from them.Out of 100 participants, 91 participants were wearing mask for more than 7 hours in a day whereas 09 participants were not wearing mask for more than 7 hours. The patients were assessed for the symptoms of dry eye such as soreness, scratchiness, dryness, glitziness and burning sensation. The Schirmer test was performed by the ophthalmologists.

Almost all individuals wearing mask for more than 7 hours in a day exhibit the dry eye symptoms such as soreness, scratchiness, dryness, glitziness and burning sensation with statistically significant difference on comparison with individuals not wearing mask for more than 7 hours in a day. Schimer's test values showed that the dry eyes were experienced more by the individuals who used to wear masks continuous for more than seven hours.

Amid COVID-19 pandemic, the use of face masks significantly reduced the outward spread of air. However, exhaled air still needs to disperse; when a face mask sits loosely against the face (nose and cheek), the likely route of the exhaled air is upwards. This forces a stream of air over the surface of the cornea, creating conditions that hasten corneal tear film evaporation, leading to dry eye symptoms **[10]**.

Although, the association between continuous use of masks and dry eye symptoms has been established, use of masks cannot be avoided amid pandemic. Therefore, some preventive and curative measures have to be adopted in this regard.Masks with a flexible nose-pin should be used. Patients sufferingfrom dry eye symptoms from extended mask wear should take breaks every few hours to remove the mask, allow the eyes to recover, and apply lubricant eye drops. Soothing eye drops may be the most effective in preventing symptoms by preserving tear film. Blinking exercises may also be helpful to recover from dry eye symptoms.MADE should not be used as an excuse for not using the mask. The ophthalmologists as well as the public need to remain aware of the MADE. The ophthalmologists should communicate their knowledge about this entity to all their patients during this time of COVID-19 Pandemic.

Further studies with larger sample size and objective assessment parameters may establish the association between continuous use of masks and dry eye symptoms.

CONCLUSION

The present observational study confirmed the presence of mask-associated dry eye (MADE), in healthcare workers and if wearing a face mask lasts longer than 7

hours per day. The healthcare workers should take the potential ocular surface health risks related to inadequately fitted facemasks into consideration.

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