Original Contribution

OCULAR SURFACE COMFORT AND FACE MASKS: DRY EYE EPIDEMIC AMID COVID 19 PANDEMIC?

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ABSTRACT

PURPOSE: The purpose of this research is evaluating the effects of wearing face masks on ocular health among medical students in the current COVID-19 pandemic. METHODS: The study includes 147 students in total, all are from Medical University in Pleven. They were interviewed anonymously about their eye health and comfort during periods of wearing face masks. RESULTS: Findings of the study highlighted that wearing face masks for prolonged periods decreases eye comfort levels. Most common presenting complaints were dryness, grittiness, scratchiness, soreness, burning and watering. Almost one quarter of interviewed students sometimes experienced eye fatigue or ocular discomfort. Severity of symptoms was described as “tolerable” in 30.8%, “uncomfortable” in 13%. Of the asked students 25.4% answered that their symptoms were getting worse while being with a protective face mask. In terms of longest uninterrupted time wearing face masks, results show: almost 20% reported more than 5 hours without break. CONCLUSIONS: As a conclusion of this study, it was observed that eye health and dry eye symptoms among medical students was adversely affected by wearing full face covering protective masks during the pandemic situation, which interferes with the quality of life and is an emerging public health issue.

Keywords: dry eye, ocular health, face masks, COVID-19 pandemic

INTRODUCTION

Since the start of COVID-19 pandemic, World Health Organization recommended physical distancing, strict personal hygiene, disinfection and antisepsics use, and widespread use of personal protective equipment, including face masks, covering nose and mouth, as key measures against the spread of the virus [1]. For medical students these protective measures, including wearing protective face masks all day against infection, are essential even without pandemic situation. But widespread use of masks led to some concerns, with masks being perceived as inconvenient or uncomfortable: prolonged use of masks has been associated with complaints of breathing difficulties, headache, irritation of the skin, fogging of glasses and sweating [2, 3]. First observations of mask-associated dry eye (MADE) are in 2020, when the American ophthalmologist D.E. White, described the condition and coined the acronym “MADE” [4].

The purpose of this research is to measure self-reported symptoms of MADE- the effect of wearing face masks on ocular health among medical students in the current COVID-19 pandemic.

MATERIALS AND METHODS

The study includes 147 students in total, all of whom study in Medical University - Pleven, with mean age 23±4 years, male n=70, female n=77. They were asked about their eye health and comfort during periods of wearing face masks.
All students were interviewed anonymously, using online questionnaire - Google docs, partially based on Standardized Patient Evaluation of Eye Dryness (SPEED) Questionnaire, in the period between 1-30 Dec. 2021. The eye fatigue questionnaire consists of 7 questions, focused on sensation of ocular discomfort and its severity and lasting during wearing full face covering protective mask - complaints of eye fatigue or tearing, feeling of blurred vision, dryness, photophobia, scratchiness, etc.

RESULTS
Findings of the study highlighted that wearing face masks for prolonged periods decreases eye comfort levels. Most common presenting complaints were dryness, grittiness, scratchiness-experienced sometimes by 32.2%, constant by 6.8% and often by 5.5% (Figure 1).

Of the respondents 26% report feeling soreness and irritation sometimes, while 6.8% had constant feeling of these symptoms while wearing protective masks over their nose and mouth. 4.8% answered “often” when filling this question (Figure 2). Symptoms as burning and watering were described in 22.6% as felt sometimes, in 8.2% as often, and in 5.5% as constant (Figure 3).

Of the interviewed students 19.5% sometimes experienced eye fatigue or ocular discomfort; 9.6% answered “often”, and 5.5% - “constant” (Figure 4). Severity of their symptoms were described as “tolerable” in 30.8%, “uncomfortable” in 13%, 7.5% described the complaints as “bothersome”, and in 2.7% symptoms were “intolerable” (Figure 5).
3. While wearing a face mask do you experience Burning or Watering in your eyes?
146 responses

![Figure 3. Distribution of answers by symptoms burning and watering.](image)

4. While wearing a face mask do you experience Eye Fatigue or Ocular Discomfort?
146 responses

![Figure 4. Distribution of answers by symptoms eye fatigue and ocular discomfort.](image)

5. How would you describe the severity of your symptoms:
146 responses

![Figure 5. Distribution of answers by self determined level of symptoms severity.](image)
A quarter /25.4%/ of asked students answered that their symptoms were getting worse while being with a protective face mask (Figure 7). In terms of longest uninterrupted time wearing face masks, results show: 6.8% reported more than eight hours without break, 12.3% wore it for more than 5-8 hours, 49.3% wore masks 2-5 hours, and 31.5% less than 2 hours (Figure 6).

**6. What time during do You spend using a protective face mask every day?**

146 responses

- 49.3% Less than 2 hours
- 25.4% 2 to 5 hours
- 31.5% 5 to 8 hours
- 12.3% More than 8 hours

![Figure 6. Distribution of answers by mask-wearing duration time daily.](image)

**7. Do you feel change in your eye symptoms (discomfort) while wearing face mask?**

142 responses

- 69.7% Yes, my symptoms are worse
- 25.4% No, I feel the same
- 5.9% Yes, I feel better

![Figure 7. Distribution of answers by reported change in ocular symptoms while using protective mask.](image)

**DISCUSSION**

Moshirfar M. and co-authors in a review from 2020 report a marked increase in dry eye symptoms among regular mask users, without reporting the prevalence of these symptoms (5). A year later Laura Boccardo performs a large anonymous online survey among the general population using Google Forms through different social media platforms and analysed a total of 3,605 surveys. She reports that 18.3% of all participants experienced mask-associated dry eye. Of the 2,447 having symptoms respondents, 26.9% reported that their symptoms were exacerbated when wearing a mask.

In a paper, published in 2020, Evelina Marinova, et al. studied the effects of face mask wearing in different people groups (according to occupation, age, sex, and type of mask used) in Bulgaria. They report that the medical personnel complained significantly more often than the occasional users of masks (p < 0.01), whilst the difference between regular protective mask users and regular ordinary mask users was not always significant. Their results are similar to ours, which we explain with the similar occupation of...
respondents, even if they are medical students, not yet hospital employees. Evelina Marinova’s results show that healthcare personnel had the highest prevalence of ocular complaints with the most severe clinical picture related to the necessity of prolonged usage of protective equipment. The authors explain that different mechanisms lead to ocular complications in face mask usage. The major factor is the outflow of exhaled air, with a temperature around 36-37 °C, passing over the upper border of the face mask to the ocular surface. This direct hot airflow leads to instability, increased evaporation, hyperosmolarity, and a decline in tear film turnover and clearance and results in ocular damage and dry eye symptoms. The severity of the symptoms correlates with the tear lipid layer thickness [7, 8]. We agree that the exhaled air has an increased concentration of carbon dioxide and a decreased level of oxygen; this decreases the tear pH levels and impairs the ocular surface [9, 10].

Similar conclusions are found in an article, published in 2021, by Iva Krolo and co-authors [11]. Authors determine if wearing a face mask during the COVID-19 pandemic causes a new onset or deterioration of previously existing dry eye disease, performing a prospective cohort study with 203 participants, all using surgical face masks daily. Authors confirmed the existence of mask-associated dry eye (MADE), most profoundly in women, subjects with a prior dry eye history, and with prolonged wearing a face mask (more than 3 hours daily) and recommend that ophthalmologists advise their patients of the potential eye surface health risks related to inadequately fitted face masks.

In 2021 Leonardo Mastropasqua, et al. conducted an interesting study, which described the face mask-related changes in the anterior ocular surface using impression cytology and in vivo confocal microscopy [12]. They prove that the regular prolonged daily use of face masks induces a significant worsening of several molecular and clinical parameters and thus damages the ocular surface in the presence of dry eye. According to the authors, when the ocular surface is healthy this detrimental effect is more limited, but it tends to become significant when the number of daily hours increases. We agree with the conclusion that prolonged face masks users should pay special attention in the presence of a concomitant eye surface disorder, such as dry eye syndrome.

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CONCLUSION
Protective face masks are a key measure to slow down the spread of COVID-19. They are necessary not only in a pandemic situation but all the time spent in a hospital environment, especially for healthcare workers and medical students. In the current study, a significant proportion of respondents reported an increase in ocular discomfort when wearing masks. Dry eye symptoms among medical students were adversely affected by wearing mouth and nose-covering protective masks during the pandemic situation. This interferes with the quality of life and is an emerging public health issue.

Similar online surveys can be useful for assessing self-reported discomfort, especially during the pandemic, which limits contact between people, although evaluating dry eye-related discomfort using only symptoms may be partial, because it is not taking into account clinical signs and medical history.

Future studies are needed to confirm and explain these findings since a small number of studies have investigated MADE, which is a temporary condition induced by a change in environment, with a different etiology to classic dry eye disease.

REFERENCES