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# Assessment of Frequency and Severity of Mask-Induced Dry Eye in University Students During COVID-19

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**Abstract:** The aim of the study was to evaluate the frequency and severity of dry eye in mask wearer and to give public awareness about dry eye disease and its serious consequences. This study provides a way of direction to diagnose dry eye and treat it timely before any serious complication. The awareness about preventive measures and treatment was given to participants. *This was* Descriptive Cross-sectional study design. The study was conducted in The University of Faisalabad. The duration of study was from December 2021 to February 2022. 100 participants were taken for this study. Non- Probability Convenient sampling technique was used for sample collection. We collected the data for our research through validated OSDI questionnaire. The analysis was presented in the form of Frequency Distribution. Out of 100 students 35 were male and 64 were females. Mean  $\pm$  SD of age of patients was  $20.62 \pm 1.523$  year. The severity level of Mask-Induced dry eye was Mild (49), Moderate (26%) and Severe (12%). Majority of participants wear surgical Mask (83%) only few wears fabric Mask (12%) and KN95 (5%). About 79% were non-spectacle users and 21% were spectacle users. The frequency of duration of Mask wear was 2-4 hours (19%), 4-6 hours (26%), 6-8 hours (32%) and 8-10 hours (23%). The present study was to determine the Frequency and Severity of Mask-Induced Dry eye in University Students. We found that majority of participants have mild and moderate type of dry eye after wearing mask.

**Keywords:** Dry-Eye Syndrome, Mask Wearing, Dry Eyes, COVID-19

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## 1. Introduction

The term dry-eye syndrome according to DEWS has been 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. [1] Patients with dry eye often complain of pain, heaviness, foreign body sensation, redness, photophobia and reflex watering due to corneal irritation. [2]

Patients may complain of symptoms of dry eye in the presence or absence of signs of the disease. A more recent area of study in dry eye is the implications for visual function and its quality. [3-5] Early detection of dry eyes is important because it can indicate the presence of systemic diseases, such as systemic lupus erythematosus, rheumatoid arthritis, and Sjogren's syndrome. DED is more prevalent in the

elderly population, especially amongst women. [6] While universal mask use in public is essential during the current pandemic to reduce disease transmission through the mouth and nose, the unprotected eye remains a vulnerable path of infection. [7-9]

The two main causes that leads to the development of ocular discomfort are the extensive use and long-term use of the visual displays during the COVID-19 pandemic and the extensive use of the facial masks. Face masks induce dry eye occurs due to blowing of the air upwards when breathing out and due to the limited movement of the lower eyelid which accelerates the evaporation of the tears and leads to the onset or the worsening of the symptoms related to the dry eye disease. [10-12] The direct airflow from exhaled air will certainly leads towards the instability, enhanced evaporation and hyperosmolarity which leads towards a decline in the turn over of the tears which ultimately leads towards drying of cornea due to face mask. [13-16]

Severity in the symptoms of mask induced ocular dryness are correlated to the thickness of the lipid layer of the tear film. [17] Prolonged wearing of mask has also shown the increased risk of virus transmission during this periods of COVID-19 pandemic as the patients rub their eyes due to disturbance of the ocular surface as caused by face masks. [18] Wearing face masks during this period of COVID-19 is mandatory but It is also necessary for Ophthalmologist and Optometrist to ensure that patient must not take mask induced dry eyes as an excuse for not wearing the face masks. Eye physicians and Ophthalmologists must be aware of the potential signs of the dry eye which are secondary to the use of the face masks. [16] Ophthalmologists and Optometrist should guide the patients to how to properly wear face mask who have to wear their spectacles or sunglasses. In order to minimize the dry eye symptoms induced by face mask, the patient should be tapping the top edge of the face mask on the nose in such a way that it does not interfere with the blinking of eyes. [20] The aim of the study was to evaluate the frequency and severity of dry eye in mask wearer and to give public awareness about dry eye disease and its serious consequences. This study provides a way of direction to diagnose dry eye and treat it timely before any serious complication. The awareness about preventive measures and treatment was given to participants.

## 2. Materials and Methods

This was Descriptive Cross-sectional study design. The study was conducted in The University of Faisalabad. The duration of study was from December 2021 to February 2022. 100 participants were taken for this study. Non- Probability Convenient sampling technique. In Inclusion criteria was age 18-27 years, Participants with no previous dry eye symptoms before mask wearing, Spectacle and non-spectacle users, those who were willing to participate, Those participants were selected who have no previous ocular inflammation, duration of mask greater than 2 hours a day. In exclusion criteria was already diagnosed dry eye before Mask wear,

Contact Lens Users, History of previous eye surgery PRK and LASIK, History of inflammatory eye condition (Scleritis, Conjunctivitis), All optometry students were excluded to avoid bias, All Syndromes, All Systemic diseases, Mentally Retarded patients, Un-cooperative patients. Standard Validated Questionnaire of Dry Eye (OSDI) was used for data collection. After taking the informed consent, we collected the data for our research through validated OSDI questionnaire. The analysis will be done by software of SPSS version 22 using Frequency Distribution.

## 3. Results

Total sample size was of 100 university student was taken in this study. The bar chart indicates that of those 100 students 35 were male and 64 were females (figure 1). Mean  $\pm$ SD of age of patients was  $20.62 \pm 1.523$  year. Age group of these participants were ranged from 15 to 25 years as shown in bar chart (figure 2). Majority of participants wear surgical Mask (83%) only few wears fabric Mask (12%) and KN95 (5%) (figure 3). About 79% were non-spectacle users and 21% were spectacle users (figure 4). The frequency of duration of Mask wear was 2-4 hours (19%), 4-6 hours (26%), 6-8 hours (32%) and 8-10 hours (23%) (figure 5). The severity level of Mask-Induced dry eye was Mild (49), Moderate (26%) and Severe (12%) (figure 6).

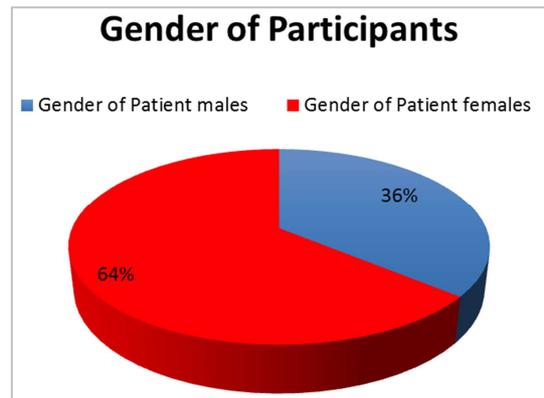


Figure 1. This is the pie chart of gender distribution of data. The percentage of male patient is 36% and female patient is 46%.

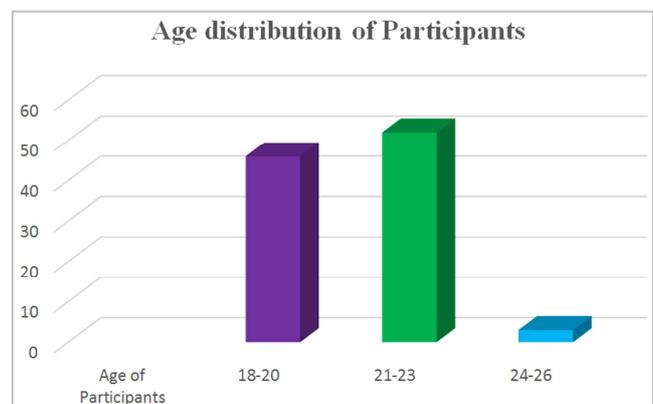


Figure 2. This bar chart shows age distribution of participants range from 16 to 26 years.

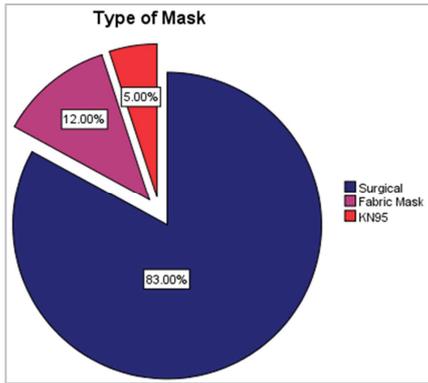


Figure 3. This pie-chart shows frequency of Participants using surgical, Fabric mask and KN95.

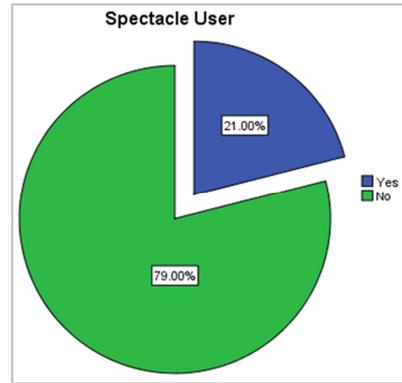


Figure 4. This pie graph shows frequency of spectacle users and non-spectacle users.

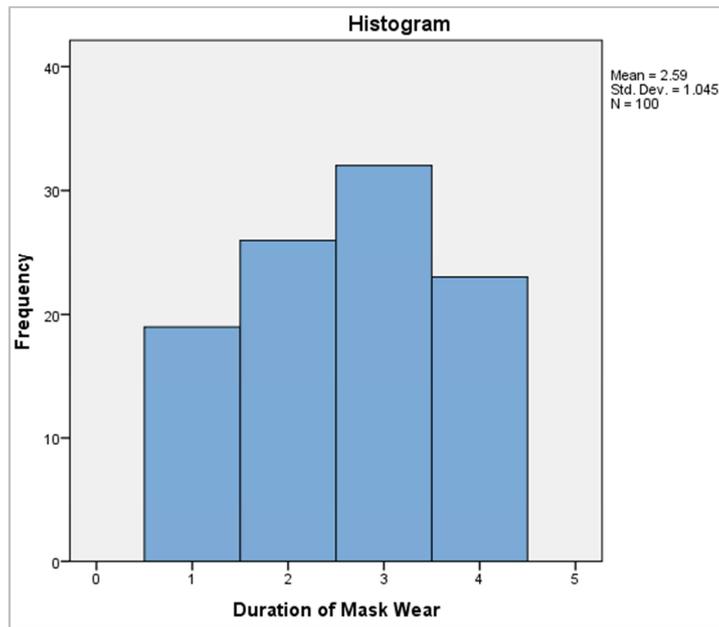


Figure 5. This histogram shows frequency of duration of Mask wear.

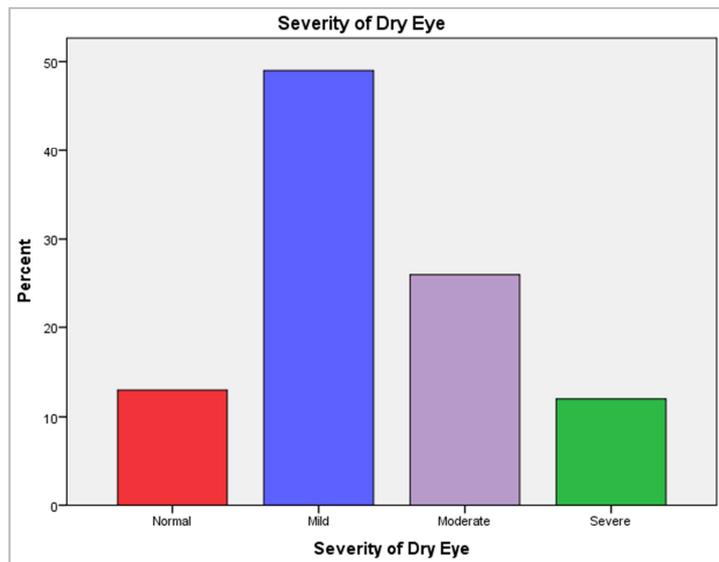


Figure 6. This bar graph shows Severity of Mask Induced Dry eye.

*Table 1. Severity of dry eye.*

| Severity of Dry Eye |          | Frequency | Percent | Valid Percent | Cumulative Percent |
|---------------------|----------|-----------|---------|---------------|--------------------|
| Valid               | Normal   | 13        | 13.0    | 13.0          | 13.0               |
|                     | Mild     | 49        | 49.0    | 49.0          | 62.0               |
|                     | Moderate | 26        | 26.0    | 26.0          | 88.0               |
|                     | Severe   | 12        | 12.0    | 12.0          | 100.0              |
|                     | Total    | 100       | 100.0   | 100.0         |                    |

*Table 2. Frequency of questions answered by participants.*

|  | None of the time | Some of the time | Half of the time | Most of the time | All of the time | N/A |
|--|------------------|------------------|------------------|------------------|-----------------|-----|
| Eyes that are sensitive to light                     | 23               | 37               | 18               | 17               | 5               |     |
| Eye that feel gritty                                 | 42               | 31               | 15               | 10               | 2               |     |
| Painful or Sore eyes                                 | 40               | 38               | 10               | 9                | 3               |     |
| Blurred vision                                       | 39               | 26               | 16               | 11               | 8               |     |
| Poor Vision  | 51               | 22               | 10               | 7                | 10              |     |
| Difficulty in reading                                | 31               | 21               | 14               | 17               | 8               | 9   |
| Difficulty in driving at night                       | 65               | 3                | 3                | 5                | 2               | 22  |
| Difficulty in working with a computer or ATM machine | 32               | 29               | 18               | 10               | 5               | 6   |
| Difficulty in watching TV                            | 22               | 32               | 18               | 16               | 7               | 5   |
| Uncomfortability in windy conditions                 | 18               | 40               | 14               | 20               | 55              | 3   |
| Difficulty in Places or areas with low humidity      | 21               | 39               | 20               | 9                | 11              |     |
| Uncomfortability in Areas that are air-conditioned   | 45               | 31               | 13               | 5                | 4               | 2   |

This table shows the frequency of questions answered by participants through validate Questionnaire.

*Table 3. Mean standard deviation of question answered.*

|   | N   | Mean | Std. Deviation |
|---|-----|------|----------------|
| Eyes that are sensitive to light?             | 100 | 1.44 | 1.166          |
| Eyes that feel gritty?                        | 100 | .99  | 1.078          |
| Painful or sore eyes?                         | 100 | .97  | 1.068          |
| Blurred vision?                               | 100 | 1.23 | 1.294          |
| Poor vision?                                  | 100 | 1.03 | 1.344          |
| Difficulty with reading?                      | 100 | 1.77 | 1.651          |
| Difficulty in driving at night?               | 100 | 1.42 | 2.109          |
| Difficulty working with computer or ATM?      | 100 | 1.45 | 1.459          |
| Difficulty in watching TV?                    | 100 | 1.69 | 1.419          |
| Eyes felt uncomfortable in windy conditions?  | 100 | 1.63 | 1.292          |
| Uncomfortability in places with low humidity? | 100 | 1.50 | 1.235          |
| Uncomfortability in air-conditioned areas?    | 100 | .98  | 1.214          |
| Valid N (listwise)                            | 100 |      |                |

This table shows the mean and standard deviation of question answered by participants through validate Questionnaire.

### 4. Discussion

In a study of dry eye syndrome a total of 15.3% reported dry eyes (feeling not sufficiently moist), and 17.3% eyes reported to be dry and irritated. More than half spend more than 6 hours a day in front of the screen. A total of 9.2%, severe to very severe pain and discomfort. A little over half (50.8%) of research participants claimed that occasionally their vision causes them to achieve less than they would want. [19]

In another study a total of 528 medical students participated in the study, Where the 52.3% of the population was female and 47.4% were men. Their average age ranged from 17 to 31 years. 78.6 percent of

medical students had myopia, and 8.71 percent had hyperopia in terms of refractive defects. Based on symptoms, 70.8 percent of people had DED (OSDI greater than 12). [20]

Evidence from the 22 research included in this Rapid Evidence Assessment highlights the frequency, fundamental traits, and symptoms of DED flares, as well as variations in tear production. Further study is required to identify and describe the symptoms of Dry Eye Disease flares, as well as to help doctors diagnose the condition early and treat patients who are experiencing flares in a timely, effective, and controlled manner. [21] Most topical medications try to replace the deficient growth factor or reduce inflammation on the surface of the eye. Most new devices and procedures are aimed at treating meibomian gland dysfunction, and one new device uses the nasolacrimal duct reflex pathway to stimulate tear production. [22]

Extended usage of digital devices and computer screens

slows down blinking substantially and strains the eyes. Certain work-related tasks can be dangerous, necessitating that employees take extra care to prevent decreased tear production or higher evaporation rates. When considering DED as a diagnosis, it is crucial to do a physical examination for any underlying autoimmune disorders described before in order to choose the best course of action. [14]

With the right nutritional diet, it is possible to maintain and retain vision, minimise age-related macular degeneration (AMD), and lessen discomfort from OSD. While helpful for overall health, omega-3 fatty acid-rich meals like salmon, mackerel, sardines, and other ocean fish were once believed to improve DED. High parenteral dosages of vitamin D therapy, according to Bae et al., were thought to improve DED by lowering ocular surface inflammation, encouraging tear production, and reducing tear instability. However, this approach is now seldom suggested as a first line of treatment. [23]

## 5. Conclusion

The present study was to determine the Frequency and Severity of Mask-Induced Dry eye in University Students. We found that majority of participants have mild and moderate type of dry eye after wearing mask.

## 6. Limitations

Patient disinterest was a study limitation, along with study was restricted to people aged 15 to 25 years. It was questionnaire based study the detailed examination was not performed to evaluate dry eye. Only University Students were included in the study. Those who wear contact lens were not included in this study. The present study's student limitations also included uninterested students, a smaller sample size, and a shorter duration.

## 7. Recommendations

1. Frequent blinking while reading can prevent the dryness of eyes and reduce the occurrence of itching and blurring of vision.
2. Take breaks of 20 seconds after every 20 minutes by looking 20 feet away in between doing continuous work.
3. Use artificial tears regularly.
4. Computer Screen should be below than eye level.
5. Wearing sunglasses and protective shield.

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