

Association Between Dry Eye And Stress In Undergraduate Medical Students In Mirpur, Azad Jammu and Kashmir

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Abstract:

Objectives: To determine the correlation between psychological stress and dry eyes, and to assess gender distribution for the latter in undergraduate medical students.

Methods: This cross-sectional study was done at Mohi-ud-Din Islamic Medical College Mirpur, Azad Jammu and Kashmir, from June to September 2021. A final sample of 157 students were recruited. Dry eye symptoms were assessed using a 12-item questionnaire, the Ocular surface disease index (OSDI, Total Score 0 – 100), and Psychological Stress was measured using Perceived Stress Scale 4 (PSS-4) questionnaires (Total score 0-15). For the Ocular surface disease index, 0 -12 was taken as normal, 13 -22 as mild, 23 – 32 as moderate, and 33 – 100 as severe disease.

Results: Out of 157 students, 82(52.2%) were Male, and 75 (47.8%) were females with a Median age of 22 (21-27) years. 97 (61.8%) had dry eyes. Median OSDI score was 15.45(0-73) and Median PSS-4 score was 8(0-15). Subjects with DED (DED group) showed significantly higher OSDI& PSS scores compared to those without DED (non-DED group) ($p<0.001$, $P=0.003$ respectively). A strong correlation was found between the severity of dry eye disease & PSS-4 score in the study population $r_s = 1$ ($p=0.001$).

Conclusion: DED is prevalent among medical students, and it has different symptoms. Males predominated over females in the DED group. Factors involved in the correlation between dry eye disease and psychological stress among medical students should be evaluated to minimize the burden of the disease. *Al-Shifa Journal of Ophthalmology 2024; 20(4): 145-150.* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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Introduction:

Dry eye disease (DED) is a disease of the ocular surface with multiple factors affecting it. In DED there is a loss of homeostasis of the tear film. Ocular symptoms appear mainly due to unsteadiness and hyperosmolarity of the tear film, inflammation of the ocular surface, and neurosensory abnormalities.¹ DED presents with a wide range of ocular symptoms (e.g. dryness of eyes, pain in eyes, reduced visual quality) and signs (e.g. less production of tears, unsteadiness of tear film, inflammation of the surface of eyes). Symptoms of DED can be unbearable, restricting the capacity to do routine work and also affecting psychological well-being in an undesirable

way.²

DED is an ocular disease that is greatly widespread and is responsible for poor quality of life among communities. Studies have reported a frequency of 5–50% in several populations all over the world.³In the Asian population, DED was reported to be 20.1% prevalent.⁴

Studies reported the prevalence of DED in Pakistan to be around 2.4 to 11%⁵, with the highest prevalence of 47.7% among computer programmers.⁶While using digital gadgets (mobile phones, laptops, desktops) for a longer period, the person experiences reduced blinking of eyes which is one of the prominent factors leading towards the development of DED.⁷In daily routine life, such digital gadgets are equally used for entertainment as well as for work as there is an emerging trend of online classes and a preference for the use of digital libraries. Clerical staff, health care workers, and administrative professionals who work from indoors on such digital devices are explicitly at a higher risk of development of DED.⁸

A person is labeled to be suffering from stress when the degree to which the individual thinks his burden overrides his capacity to cope. One of the factors to gauge the health of the student is to assess the presence of stress, as it imparts its effect by disturbing the mental and physical health of the individual.⁹Medical students face increased psychological stress mainly due to enormous amounts of academic burden and competition with peers.¹⁰

Many studies have attempted to identify the risk factors for the development of DED. This study was carried out to explore the correlation between DED & psychological stress among medical students at Mohi-ud-Din Islamic Medical College Mirpur.

Methodology:

This was a cross-sectional study carried out at the Mohi-ud-Din Islamic Medical College Mirpur from 2nd June 2021 to 5th

September 2021 after approval by the Ethical Review Board (ERB) of Mohi-ud-Din Islamic Medical College Mirpur, Azad Jammu and Kashmir.

Sampling was done through a convenient technique. Undergraduate medical students from 3rd year, 4th year, and 5th-year MBBS were included in the study while students having ongoing medical illnesses, using contact lenses, history of refractive surgery, using screens > 4 hours daily, sleeping < 5 hours, using eye drops or having ocular disease were thereby excluded.

200 medical Students were selected for the study, of which 15 students did not give consent, while 28 students were excluded from the study as they did not meet the required inclusion criteria.

Pre-defined questionnaires for dry eye (a 12-item questionnaire, OSDI) and stress (PSS-4 including 4 questions) were distributed among medical students in their respective lecture halls. OSDI questionnaire comprised questions about dry eye symptoms that every student experienced one month prior. The OSDI was expressed as a sum score between 0–100.

The psychological stress was assessed using the Perceived Stress Scale 4 (PSS-4) questionnaire.

The questions in this scale are related to the feelings and thoughts of the candidate during the previous month. Quantification of the score is between 0 and 4 where 0 is referred to as never and 4 is very often. Higher scores reflected an increased perceived psychological stress. Participants also filled in demographic data like age and gender as mentioned on the given questionnaire.

Variables were identified as the dependent variable which was the presence of dry eye while independent variables were age, sex, PSS score, and OSDI score. The SPSS 22 program was used to determine the results. Qualitative data were assessed using the Chi-square test and quantitative data by the t-test. The relation between dry eye

and stress was analyzed using Spearman’s correlation coefficient.

Results:

A total of 157 students were evaluated. Dry eye symptoms were assessed using a 12-item questionnaire OSDI (Total Score 0

– 100)¹⁰, and Psychological Stress was measured using Perceived Stress Scale 4 (PSS-4) questionnaires (Total score 0-15). Students having dry eyes were 97 (61.8%) and those without dry eyes were 60 (38.2%).Prevalence of dry eye was 61.8%.

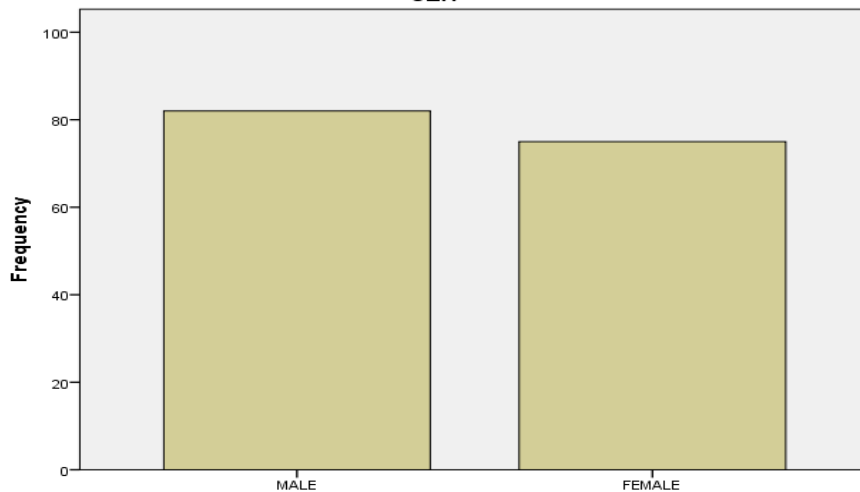


Figure:1 Gender distribution among all students (n=157)

Table 1: Perceived Stress Scale Questionnaire

In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
In the last month, how often have you felt that things were going your way?	0	1	2	3	4
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

The age, OSDI, and PSS-4 had non-normal distribution among the students with $p<0.001$, $p<0.001$ and $p=0.01$ respectively. The median(IQR) age was 22 (21 to 27) years. Median(IQR) OSDI score was 15.45(0-73) and Median(IQR) PSS-4 score was 8(0-15).

Mild disease was seen in 33.1%, Moderate Disease in 16.6%, and Severe disease in 12.7 % of students (per criteria given for OSDI). The most common

complaint in dry eye was sensitivity to light followed by problems watching TV and problems at places or areas of low luminance.

Out of 97 students who had DED, 54 (55.67%) were Male, and 43 (44.33%) were females. On comparison of age, OSDI, and PSS-4 score between dry eye disease and non-dry eyes diseased groups, there was a significant difference in OSDI and PSS-4 score between the groups.

OSDI and PSS-4 scores were significantly higher in the DED group as compared to

the non-DED group ($p=0.000$, $p=0.003$ respectively).

Table 2: Comparison of the scores by presence and absence of dry eye disease

Variable	DED group	Non-DED group	<i>p</i> -value
Age	22(21-25)	22(21-27)	0.890
OSDI	20.83 (13-73)	6.25(0-16)	0.000*
PSS	8.00(2-15)	6.00(0-14)	0.003*

DED group: patients with dry eye disease. Non-DED group: patients without dry eye disease. All data are expressed as median (IQR). *P value was calculated using the Mann-Whitney test. A strong correlation was found between the severity of dry eye disease & PSS-4 score in the study population, $r_s= 0.2$ ($p=0.001$). There was no correlation between age and DED among the medical graduates, $r_s= 0.01$ ($p=0.83$).

Discussion:

In our study, we assessed the prevalence of DED in undergraduate medical students in Mohi Uddin Islamic Medical College, Mirpur, Azad Jammu Kashmir. Dry eye disease was defined as the presence of one or more dry eye symptoms included in the 9-item questionnaire often or all the time.

Dry eye disease is quite prevalent all over the world with a prevalence of 5–50%, it is variable due to diversity in ages and different study populations.¹¹

Increased use of screens has impacted our daily routine life, and in the same way, the usage of gadgets has affected our vision in terms of visual problems like dry eye disease.¹²

The current study found that the prevalence of the DED was 61.8% among undergraduate medical students in Mohi Uddin Islamic Medical College, Mirpur, Azad Jammu Kashmir. The most common complaint in dry eye was sensitivity to light followed by problems watching TV

and problems at places or areas at low luminance. A Pakistani study reported the prevalence of DED among IT students as high as 47%, possibly due to screen-related exposure to their relevant field.¹¹

In our study, we could not find any correlation between age and OSDI score. Serwat et al. (2023) also reported no association between age and OSDI score among IT students of the age group 17-25 years. This finding is significant, as it indicates that in patients under 30 years of age, dry eye disease (DED) likely does not have a correlation with age

In the current study, there was a high percentage of males (55.67%) as compared to females (44.33 %) having dry eye disease with a non-significant difference in disease. In the study, done by Serwat et al (2023), more males among study participants had DED as compared to female study participants¹¹. Alnahdi et al. (2022) reported a higher prevalence of DED among females¹³. The female study participants that were included in their study, were of post-menopausal age. This may be the reason for the difference from our study. As our female participants were of the young age group.

In our study, the most common complaint related to DED was sensitivity to light followed by problems watching TV and problems at places or areas of low luminance. However, other studies have reported variable findings, for instance, some research indicated that a burning

sensation and excessive tearing were the most common complaints among participants with DED.^{11,14}

This study explored the correlation between psychological stress and dry eye disease among undergraduate medical students. The psychological stress was assessed by using the PSS-4 score, which has been considered a reliable tool.¹⁰ We found a positive correlation between psychological stress and dry eye disease among study participants. Psychological stress may have some link with the risk of developing DED.¹⁰ Numerous mechanisms may be involved in the linking the psychological stress and DED, although they are not clearly understood yet¹⁰. Psychological stress may lead to altered production of inflammatory mediators in the body which can lead to multiple problems, DED is one of them¹⁵. Psychological stress causes an increased production of the stress hormone, cortisol, in the body can lead to an increased perception of pain¹⁶. This suggests that individuals experiencing psychological stress may be more susceptible to developing dry eye symptoms.

In medical students' context, the high stress levels associated with their challenging academic demands could exacerbate these physiological responses. As medical students often face intense pressure, the potential impact of psychological stress on ocular health warrants further exploration. Understanding this association is crucial for developing effective interventions to mitigate DED symptoms in this population.

Conclusion:

In conclusion, this study supported the hypothesis that symptomatic DED is possibly prevalent in medical students. Psychological stress evaluated using the PSS-4 questionnaire had a significant correlation with the Ocular surface disease index (OSDI) score.

References:

1. Zemanová m. dry eye disease. a review. *CeskSlovOftalmol.* 2021 Winter;77(3):107–119.
2. Mittal R, Patel S, Galor A. Alternative therapies for dry eye disease. *CurrOpinOphthalmol.* 2021 Jul 1;32(4):348-361.
3. Wróbel-Dudzińska D, Osial N, Stępień PW, Gorecka A, Żarnowski T. Prevalence of Dry Eye Symptoms and Associated Risk Factors among University Students in Poland. *Int J Environ Res Public Health.* 2023 Jan 11;20(2):1313.
4. Cai Y, Wei J, Zhou J, Zou W. Prevalence and Incidence of Dry Eye Disease in Asia: A Systematic Review and Meta-Analysis. *Ophthalmic Res.* 2022;65(6):647-658.
5. Shaheerah G, Adil S J, Muhammad F F. Frequency and Risk Factors of Symptomatic Dry Eye Disease at Tertiary Care Eye Hospital, Karachi. *Biostat Biometrics Open Acc J.* 2018; 4(3): 555639
6. Shaheerah G, Adil S J, Muhammad F F. Frequency and Risk Factors of Symptomatic Dry Eye Disease at Tertiary Care Eye Hospital, Karachi. *Biostat Biometrics Open Acc J.* 2018; 4(3): 555639.
7. Fjaervoll K, Fjaervoll H, Magno M, Nøland ST, Dartt DA, Vehof J, Utheim TP. Review on the possible pathophysiological mechanisms underlying visual display terminal-associated dry eye disease. *Acta Ophthalmol.* 2022 Dec;100(8):861-877.
8. Tripathi A, Agarwal R, Kharya P. Dry eye disease related to digital screen exposure in medical students. *Pan Am J Ophthalmol* 2022; 4(1): 35.
9. Chowdhury R, Mukherjee A, Mitra K, Naskar S, Karmakar PR, Lahiri SK. Perceived psychological stress among undergraduate medical students: Role of academic factors. *Indian J Public Health.* 2017 Jan-Mar;61(1):55-57.

10. Hyon JY, Yang HK, Han SB. Dry Eye Symptoms May Have Association with Psychological Stress in Medical Students. *Eye Contact Lens*. 2019 Sep;45(5):310-314
11. Sarwat S, Mamoon I, Ayub F. Prevalence of dry eye disease among IT students in Pakistan, 14 February 2023, PREPRINT (Version 1) available at Research Square[<https://doi.org/10.21203/rs.3.rs-2540748/v1>]
12. Courtin R, Pereira B, Naughton G, Chamoux A, Chiambaretta F, Lanhers C, Dutheil F. Prevalence of dry eye disease in visual display terminal workers: a systematic review and meta-analysis. *BMJ Open*. 2016 Jan 14;6(1):e009675.
13. Alnahdi W, Hadrawi M, Danish E, Alghamdi A, Taher N, Alfaraidi AT, Alageel N. Relationship Between Screen Time and Dry Eye Symptoms During the COVID-19 Pandemic in the Pediatric Population of the Western Region of Saudi Arabia. *Cureus*. 2022 Nov 2;14(11):e31015.
14. Arif SA, Khan MI, Abid MS, Babar A, Arif MA, Jahanzaib HM, Khan I. Frequency and impact of individual symptoms on quality of life in dry eye disease in patients presenting to a tertiary care hospital. *J Pak Med Assoc*. 2021 Apr;71(4):1063-1068.
15. Shields GS, Kuchenbecker SY, Pressman SD, Sumida KD, Slavich GM. Better cognitive control of emotional information is associated with reduced pro-inflammatory cytokine reactivity to emotional stress. *Stress*. 2016;19(1):63-8.
16. Cohen S, Janicki-Deverts D, Doyle WJ, Miller GE, Frank E, Rabin BS, Turner RB. Chronic stress, glucocorticoid receptor resistance, inflammation, and disease risk. *Proc Natl Acad Sci U S A*. 2012 Apr 17;109(16):5995-9.

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