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Association of Dry Eye, Sleep Quality, Anxiety and Depression among Young Pakistani Adults: A Cross-Sectional Study

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ABSTRACT

Dry eye is a complex syndrome defined by tear film instability that is influenced by a number of factors, including anxiety, sadness, and quality of disease. **Objective:** To determine the connections between anxieties, depression, dry eye and sleep quality. **Methods:** A cross-sectional study conducted at Madinah Teaching Hospital in Faisalabad using a non-probability sampling technique. Participants had to be between the ages of 20 and 35 and free of clinically serious eye abnormalities or known sleep problems in order to be included. Those who were taking medication or had surgery within the last six months were not included. Descriptive statistics, Pearson correlation, and multiple linear regression were used to analyze the results of the HADS, OSDI, and PSQI, which measure symptoms of anxiety and depression, dry eye, and sleep quality, respectively. **Results:** Descriptive statistics showed that the average age was 22.10 ± 1.94. Multiple linear regression was used to find a significant ($p<0.001$) association between the OSDI and PSQI subscales (sleep latency, sleep interruptions, and use of sleep aids). Other factors that did not show statistically significant relationships with the regression model were subjective habitual sleep efficiency, sleep duration, sleep quality, and dysfunction throughout the day ($p>0.001$). The assessment of multiple linear regression revealed that the OSDI and the other variables, HADS-A, HADS-D, and PSQI total score, were related to the following values: $p=0.29$, $p=0.001$, and $p<.001$, respectively. **Conclusions:** Dry eye disease showed significant associations with depression and poor sleep quality but not with anxiety.

INTRODUCTION

The ocular surface and tear film are usually impacted by the complex condition known as dry eye disease (DED) [1]. Prevalence assessments ranges from 5% to 50%, depending on the sample size of the study, badly influencing the millions of individuals globally [2]. Due to the immediate treatment costs and decreased productivity at work, DED poses a substantial financial burden [3]. Common symptoms include light sensitivity, eye burning, ocular discomfort, and blurred vision [4]. Because these symptoms make it more difficult to work, connect with others, and perform daily tasks, they have the potential to dramatically reduce quality of life [5, 6]. Dry eye illness comes in two varieties: chronic and episodic. One of the most frequent causes of DED episodes is prolonged visual demands that prevent blinking. If these underlying causes persist over time, episodic DED may eventually give way to the chronic form of the disorder [7-9]. Anxiety and depression are two of the most prevailing mood disorders, and dry eye can have a notable influence on a patient's mental state and quality of life [10]. Insomnia and obstructive sleep apnea are only two examples of the many illnesses that fall under the umbrella of "sleep disorders." In

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recent years, these anomalies have increased in frequency [11, 12]. Reduced tear production and higher tear osmolarity could be the cause of the link between sleep deprivation and DED [13]. In nations including the US, South Korea, Japan, and Turkey, numerous research have examined the connection between sleep quality and DED [14–17]. Although these relationships are becoming more widely recognized, previous research has not looked at the relationships between Dry Eye Disease (DED), anxiety, depression, and sleep problems in the Pakistani population. Given the growing prevalence of DED and mental health problems, especially in metropolitan areas, this study focuses on evaluating the relationship between DED, anxiety, depression, and sleep quality among adults in Faisalabad, Pakistan. It was predicted that those with DED will sleep less and experience more psychological distress than those without the condition.

METHODS

The 370 individuals were recruited at the Madina Teaching Hospital in Faisalabad, Pakistan, between March and May 2025. On March 13, 2025, approval was given by the University of Faisalabad's Ethical Institutional Review Board. TUF/IRB/19/25 was the reference number on the ethical approval letter for this study. The study's approach adhered to the principles outlined in the Helsinki Declaration. Every participant in the study provided their informed permission. The study's sample size was calculated to be 370 individuals using RaoSoft software. Among the criteria used in the calculation were a population size of 10,000, a 95% confidence level, and a 5% margin of error. The study used a non-probability purposive sampling technique. Participants in the study had to be between the ages of 20 and 35, university-educated, of both sexes, in good general health, with a clinically verified diagnosis of dry eye disease, and able to understand and complete the study questions on their own using sufficient cognitive ability and English proficiency. Individuals with anterior segment ocular problems, bilateral cataracts, severe glaucoma, or previous record of ocular surgery within the last three months were not included. People with systemic issues, such as serious cardiac disease, autoimmune disorders, neurological or behavioral abnormalities, and allergy diseases, were also not included. Those who were on hormonal contraceptives, antidepressants, anti-anxiety medications, or had a history of anxiety or depression were not allowed to participate. Additionally excluded were women who were nursing or pregnant. Medical and demographic data were collected from each participant. Each participant completed the Ocular Surface Disease Index (OSDI), a self-administered questionnaire designed to evaluate the severity of self-reported Dry Eye Disease (DED). Based on their overall OSDI score, participants were categorised as normal (0–12), mild (13–22), moderate (23–32), and severe (33–100). A DED score of at least thirteen was deemed suggestive. The specific effects of dry eye are measured using the Ocular Surface Disease Index (OSDI)© [18]. Moreover, Pittsburgh Sleep Quality Index (PSQI) was used to assess the quality of sleep during the past month [19]. In total there were seven criteria assessed by this questionnaire such as sleep latency, subjective sleep quality, duration, habitual sleep efficiency, sleep disruptions, use of sleep aids, and dysfunction throughout the day. The overall score ranges from 0 to 21, with each PSQI component having a value between 0 and 3. Poorer sleep quality is indicated by higher scores. Poor sleep was indicated by a total score higher than 7. The Hospital Anxiety and Depression Scale (HADS) was generated by Snaith Zigmond, to assess patients for anxiety and depression symptoms in typical hospital environments [20]. The 14 questions are separated into two subscales, each with seven items: one for anxiety and one for depression. If the overall score is 8 or higher, there may be anxiety or hopelessness. Each item is given a score on a four-point Likert scale (0–3). The remarkable accuracy and dependability of HADS in clinical and research contexts account for its widespread use. Since there were no approved Urdu translations of the OSDI, PSQI, or HADS questionnaires available at the time of the study, data was gathered using the English versions. The inclusion criteria had been expanded to include English language proficiency in order to guarantee that participants could regularly complete these instruments. IBM SPSS version 23.0 was used to do statistical analysis. While Mean ± Standard Deviation (SD) is used to display continuous variables like age, frequency distributions were used to highlight categorical data like gender and the frequency of dry eyes. The associations between psychological stress (assessed by the HADS), sleep quality (assessed by the PSQI), and dry eye symptoms (assessed by the OSDI) were examined using Pearson correlation analysis. Multiple linear regression models were also used to investigate the potential mediating effects of total PSQI and HADS scores on the relationship between OSDI scores. Both multiple linear regression analysis and Pearson correlation were used to investigate the link between certain PSQI subscale scores and OSDI scores. Standardized regression coefficients (Beta) were used to quantify the direct and indirect impacts, whereas unstandardized regression coefficients (B) were used to evaluate their significance. A p-value of less than 0.05 was considered to be statistically significant.

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RESULTS

Among the demographic data collected for this study were age and gender. The total sample size is 370 individuals. Descriptive statistics and frequency distribution were used for statistical analysis. The average age of the participants was 22.10 years (SD = 1.94). Among the participants, there were 260 women (70.3%) and 110 men (29.7%). 255 people (68.91%) did not have DED, according to the research population's frequency distribution of DED severity. Table 1 shows that of those with a DED diagnosis, 24 (6.48%) had severe DED, 50 (13.51%) had moderate DED, and 41 (11.08%) had mild DED.

Table 1: Frequency of Non- DED and DED Grades

Variable		Frequency (%)
Non-DED		255 (68.91)
DED	Mild	41 (11.08)
	Moderate	50 (13.51)
	Severe	24 (6.48)

Descriptive analysis was done on the OSDI and PSQI subscale components. The mean OSDI score for the sample was 15.03 (SD = 18.78), which indicates a relatively modest level of dry eye symptoms. The PSQI components were as follows: subjective sleep quality was 0.94 (SD = 0.67), habitual sleep efficiency was 0.42 (SD = 0.68), sleep disturbance was 0.72 (SD = 0.73), subjective sleep latency was 0.78 (SD = 0.76), subjective sleep duration was 0.89 (SD = 0.87), and daytime dysfunction was 0.62 (SD = 0.73). The associations between OSDI and sleep quality measures were evaluated using Pearson correlation coefficients. Sleep disturbance ($r = .398$, $p < .001$), sleep medication use ($r = .235$, $p < .001$), daytime dysfunction ($r = .242$, $p < .001$), sleep latency ($r = .284$, $p < .001$), subjective sleep quality ($r = .186$, $p < .001$), and sleep duration ($r = .164$, $p = .001$) were all significantly positively correlated with the OSDI score. These results imply that higher levels of dry eye symptoms are linked to lower sleep quality (Table 2).

Table 2: Descriptive Statistics and Correlation Matrix Analysis for OSDI and PSQI Subscales

Variable	Mean ± SD	Pearson correlation coefficient (r) with	p-Value (1-tailed)
OSDI	15.03 ± 18.78	-	-
Subjective Sleep Quality	0.94 ± 0.67	0.186	p < 0.001
Sleep Latency	0.78 ± 0.76	0.284	p < 0.001
Sleep Duration	0.89 ± 0.87	0.164	p < 0.001
Habitual Sleep Efficiency	0.42 ± 0.68	0.157	p < 0.001
Sleep Disturbance	0.72 ± 0.73	0.398	p < 0.001
Use Of Sleep Medication	0.34 ± 0.57	0.235	p < 0.001
Day Time Disfunction	0.62 ± 0.73	0.242	p < 0.001

A multiple linear regression analysis was used to determine which aspects of sleep quality are predictive of OSDI scores. The model explained more than 22% of the variation in OSDI values ($R2 = .219$, Adjusted $R2 = .203$) and was statistically significant ($F(7,362) = 14.47$, $p < .001$). The variables that were shown to be substantially linked with higher OSDI scores were sleep disturbance ($B = 7.19$, $p < .001$), sleep latency ($B = 3.30$, $p = .011$) and the use of sleep medication ($B = 4.48$, $p = .006$). The regression model did not reveal statistically significant correlations with other parameters, including subjective sleep quality, sleep duration, habitual sleep efficiency, and dysfunction during the day (Table 3).

Table 3: Multiple Linear Regression Analysis between OSDI and PSQI subscale

Predictor	B	SE	Beta	t	p-Value	95% CI (Lower, Upper)
(Constant)	2.49	1.76	—	1.416	0.158	-0.97, 5.95
Subjective Sleep Quality	0.72	1.44	0.026	0.498	0.619	-2.12, 3.55
Sleep Latency	3.30	1.29	0.134	2.562	0.011	0.77, 5.83
Sleep Duration	0.82	1.09	0.038	0.755	0.451	-1.32, 2.95
Habitual Sleep Efficiency	2.25	1.36	0.081	1.660	0.098	-0.42, 4.92
Sleep Disturbance	7.19	1.39	0.278	5.155	p < 0.001	4.45, 9.93
Use of Sleep Medication	4.48	1.62	0.137	2.770	0.006	1.30, 7.67
Daytime Dysfunction	1.48	1.36	0.058	1.095	0.274	-1.18, 4.1
Model Summary: $R = .468$, $R^2 = .219$, Adjusted $R^2 = .203$, $F(7, 362) = 14.47$, $p < .001$						

The OSDI, PSQI, and HADS were among the descriptive and correlational analyses that were carried out. The mean scores for the HADS-Depression and HADS-Anxiety subscales were 7.73 (SD = 2.89) and 8.23 (SD = 3.08), respectively. A overall average PSQI score of 4.71 (SD = 2.81) indicated a sleep disruption. Pearson correlation coefficients were calculated in order to examine the correlations among OSDI, HADS, and PSQI total scores. Significant positive correlations were seen between OSDI and HADS-A ($r = .189$, $p < .001$), HADS-D ($r = .251$, $p < .001$), and PSQI total score ($r = .422$, $p < .001$). Additionally, there were significant correlations between anxiety and depression and PSQI scores, as well as a substantial correlation between the two ($r = .332$, $p < .001$), indicating a relationship between emotional distress, sleep quality, and dry eye symptoms (Table 4).

Table 4: Correlation Matrix Analysis and Descriptive Statistics for OSDI, PSQI, HADS-A, and HADS-D

Variable	Mean ± SD	Pearson correlation coefficient (r) with OSDI	p-Value
OSDI	15.03 ± 18.78	—	—

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HADS-A	8.23 ± 3.08	0.189	p < 0.001
HADS-D	7.73 ± 2.89	0.251	p < 0.001
PSQI Total	4.71 ± 2.81	0.422	p < 0.001

A multiple linear regression analysis was performed to determine whether anxiety (HADS-A), depression (HADS-D), and sleep quality (PSQI) were significant predictors of dry eye symptoms (OSDI). The model was significant (F(3, 366) = 32.45, p <.001) and explained more than 21.0% of the variation in OSDI values (R2 =.210). The corrected R2 of.204 indicated a very strong model fit. Regression coefficients showed that the two best predictors of OSDI were PSQI (B = 2.54, p <.001) and HADS-D (B = 1.04, p =.001). The strongest and most significant correlation was seen between OSDI and sleep quality (PSQI_TOTAL, B = 2.540, p <.001). OSDI rose by 2.54 units for each unit increase in PSQI (worsening sleep). However, B = 0.32, p =.299 suggests that HADS-A was not a predictor that was statistically significant. These results suggest that anxiety, depression, and poor sleep are important factors that affect the severity of dry eye symptoms, even though anxiety alone does not predict OSDI scores. Higher anxiety levels may be marginally linked to more dry eye symptoms, according to the data, which showed a small but statistically significant positive correlation between HADS-A (anxiety) scores and OSDI. The somewhat higher association between depressed symptoms as judged by the HADS-D and OSDI indicates that depression and dry eye are more strongly correlated than anxiety. The PSQI total score, which measures overall sleep quality, showed the highest and most significant positive connection with the severity of dry eye symptoms out of the three components. This suggests that sleep problems have a major impact on the development of dry eye symptoms (Table 5). The findings indicate a substantial correlation between the severity of dry eye symptoms and both poor sleep quality and higher depression levels. Anxiety was not an independent predictor in the multivariate model. This suggests that addressing sleep deprivation and depression may help lessen the symptoms of dry eyes, especially in populations with borderline psychological distress.

Table 5: Multiple Linear Regression Analysis between OSDI, PSQI, HADS-A and HADS-D

Predictor	B	SE	β	t	p	95% CI for B
Intercept	-7.60	3.08	—	-2.46	0.014	-13.66, -1.53
PSQI	2.54	0.32	0.379	7.90	<0.001	1.91, 3.17
HADS-A	0.32	0.31	0.052	1.04	0.299	-0.28, 0.92
HADS-D	1.04	0.32	0.160	3.23	0.001	0.41, 1.68
Model fit: $F(3, 366) = 32.45$, $p < .001$, $R^2 = 0.210$, Adjusted $R^2 = 0.204$						

DISCUSSION

This study investigated the potential moderating effects of sleep on the association between depression, anxiety, and dry eye disease (DED). The results showed that subjective sleep quality and sleep latency acted as mediators in the connection between DED and depression. These findings are consistent with those of Wu *et al.*, who found that anxiety and depression were more common in people with DED and sleep issues [21]. Symptoms of Dry Eye Disease (DED) can negatively impact mood and mental health [22, 23]. Although its precise genesis is still unknown, numerous explanations have been proposed to explain the correlation between DED and depression. First, sex hormones may play a role in the pathophysiology of both depression and DED, as they are thought to be comorbid diseases [10, 24] with similar risk factors including female sex and menopause. More than 80% of depressed people exhibit somatization, which is the second element that may make DED symptoms worse [25]. Additionally, this study suggests two possible pathways for subjective sleep latency and quality that may assist elucidate the relationship between DED and psychological discomfort, including melancholy and anxiety. 321 clinic-based DED patients in China during the pandemic caused by COVID-19 were assessed for anxiety, depression, and sleep disturbance using the OSDI, HADS, and PSQI in a cross-sectional study carried out in 2022 by He *et al.* The majority of patients had both anxiety (26.8%) and sadness (26.5%), and there was a strong correlation between the severity of DED symptoms and mood and sleep measures [26]. Despite included a broad age range of Pakistanis with university degrees who lived in the neighbourhood, the current study only discovered a significant correlation between sleep and melancholy, not anxiety. Differences in the environment, cultural background, and the recruitment of younger, generally healthier individuals may all contribute to this discrepancy.These methodological and demographic differences reinforce the interpretation of our results in the unique setting of Pakistan. Magno *et al.*, found that individuals with dry eye had considerably worse sleep quality across all demographic categories, even after treating other pertinent diseases [27]. By discovering that starting dry eye treatment greatly enhanced the quality of sleep for newly diagnosed DED patients, Ayaki *et al.*, further confirmed the impact of DED on sleep.These results are consistent with our observations [28]. This study emphasizes the connections between anxiety, depression, sleep deprivation, and dry eye disease (DED), highlighting the necessity of managing DED through a multidisciplinary approach. It is advised that practitioners look for psychological and sleep problems and think about making early referrals to sleep or mental health specialists because DED can significantly affect quality of life. Focused therapies can be guided by integrating approved diagnostic tools into clinical evaluations. This cross-sectional study clarifies the link between psychological stress, sleep issues, and dry eye, although it does not establish causation. It is more difficult to understand the long-term effects in the absence of follow-up. This study suggests that future longitudinal studies should look into

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the possible long-term effects of these factors.

CONCLUSIONS

The study found that whereas dry eye illness was strongly linked to sadness and poor sleep quality, it was not significantly linked to anxiety. It is therefore recommended that eye care professionals thoroughly test for anxiety, depression, and sleep issues as part of a holistic therapeutic approach when a patient appears with DED.

Authors Contribution

Conceptualization: SB
Methodology: AH, MW
Formal analysis: AA, SRB
Writing, review and editing: MJ, MS

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Hakim FE and Farooq AV. Dry eye disease: an update in 2022.Journal of the American Medical Association .2022Feb;327(5):478-9.doi:10.1001/jama.2021.199 63.

[2] Papas EB. The global prevalence of dry eye disease: A Bayesian view. Ophthalmic and Physiological Optics. 2021 Nov; 41(6): 1254-66. doi: 10.1111/opo.12888.

[3] Chan C, Ziai S, Myageri V, Burns JG, Prokopich CL. Economic burden and loss of quality of life from dry eye disease in Canada. British Medical Journal Open Ophthalmology. 2021 Sep; 6(1). doi: 10.1136/bmjophth-2021-000709.

[4] Tsubota K, Pflugfelder SC, Liu Z, Baudouin C, Kim HM, Messmer EM *et al.* Defining dry eye from a clinical perspective. International Journal of Molecular Sciences.2020Dec;21(23):9271.doi:10.3390/ijms21 239271.

[5] Pan H, Pan X, Gu D, Wang X. Effects of social support on vision-related quality of life in older adults with dry eye disease: the chain mediating role of illness perception and coping style. Frontiers in Psychology. 2024 Jul; 15:1411661. doi: 10.3389/fpsyg.2024.1411661.

[6] Cutrupi F, De Luca A, Di Zazzo A, Micera A, Coassin M, Bonini S. Real life impact of dry eye disease. InSeminars in Ophthalmology.2023Nov;38(8):690-702. doi: 10.1080/08820538.2023.2204931.

[7] Liu M, Kumar A, Bukkapatnam S, Kuttolamadom M. A review of the anomalies in directed energy deposition (DED) processes & potential solutions-part quality & defects. Procedia Manufacturing. 2021 Jan; 53: 507-18. doi: 10.1016/j.promfg.2021.06.093.

[8] Oganov A, Yazdanpanah G, Jabbehdari S, Belamkar A, Pflugfelder S. Dry eye disease and blinking behaviors: A narrative review of methodologies for measuring blink dynamics and inducing blink response.The Ocular Surface.2023Jul;29:166-74.doi:10.1016/j.jtos .2023.05.011.

[9] Sabucedo-Villamarin B, Garcia-Queiruga J, Cacabelos-Torres L, Giraldez MJ, Yebra-Pimentel E, Pena-Verdeal H. Short-Term Changes in Tear Film Stability and Tear Volume Following the Application of Various DED Management Options in a Healthy Young Population. Journal of Personalized Medicine. 2025 Apr; 15(5): 173. doi: 10.3390/jpm15050173.

[10] Morthen MK, Magno MS, Utheim TP, Snieder H, Hammond CJ, Vehof J. The physical and mental burden of dry eye disease: a large population-based study investigating the relationship with health-related quality of life and its determinants. The Ocular Surface.2021Jul;21:107-17.doi:10.1016/j.jtos.2021.05. 006.

[11] Bijwadia J. Current Classification of Sleep Disorders. InDental Sleep Medicine: A Clinical Guide.2022Sep: 71-101. doi: 10.1007/978-3-031-10646-0_3.

[12] Anghel L, Ciubară A, Nechita A, Nechita L, Manole C, Baroiu L *et al.* Sleep disorders associated with neurodegenerative diseases. Diagnostics.2023Sep; 13(18): 2898. doi: 10.3390/diagnostics13182898.

[13] Li A, Zhang X, Guo Y, Wang J, Hao Y, Gu Y *et al.* The association between dry eye and sleep disorders: the evidence and possible mechanisms.Nature and Science of Sleep.2022Dec:2203-12.doi:10.214 7/NSS .S378751.

[14] Sariyeva İsmayılov A and Aydin Guclu O. The effect of OSAS risk, excessive daytime sleepiness, insomnia severity and sleep quality on dry eye syndrome. Sleep and Biological Rhythms. 2020 Jul; 18(3): 259-65. doi: 10.1007/s41105-020-00267-9.

[15] An Y and Kim H. Sleep disorders, mental health, and dry eye disease in South Korea.Scientific Reports.20 22Jun;12(1):11046.doi:10.1038/s41598-022-14167-0.

[16] Citradewi AA, Widiana IG, Susila NK, Djelantik AA. Correlation of depression, anxiety and stress level on dry eye disease severity.International Journal of Health Sciences.2022Sep;6(S9):1733-44.doi:10.5 3730/ijhs.v6nS9.12747.

[17] McCann P, Abraham AG, Mukhopadhyay A, Panagiotopoulou K, Chen H, Rittiphairoj T *et al.* Prevalence and incidence of dry eye and meibomian gland dysfunction in the United States: a systematic review and meta-analysis. Journal of the American

DOI: https://doi.org/10.54393/pbmj.v8i7.1267

Medical Association Ophthalmology.2022Dec;140(12):1181-92.doi:10.1001/jamaophthalmol.2022.4394.

[18] Schiffman RM, Christianson MD, Jacobsen G, Hirsch JD, Reis BL. Reliability and validity of the ocular surface disease index.Archives of Ophthalmology. 2000May;118(5):615-21.doi:10.1001/archopht.118.5.615.

[19] Zarrabi H, Novin MH, Soleimani R, Shirkhan Maleki B, Speily SK. The Psychometric Properties of the Persian Version of the Smoking Urge Questionnaire in the General Population.Caspian Journal of Neurological Sciences.2024Jul;10(3):218-24.doi:10.32598/CJNS.10.38.488.1.

[20] Snaith RP and Zigmond AS. The hospital anxiety and depression scale. British Medical Journal (Clinical research ed.).1986Feb;292(6516):344.doi:10.1136/bmj.292.6516.344.

[21] Wu M, Liu X, Han J, Shao T, Wang Y. Association between sleep quality, mood status, and ocular surface characteristics in patients with dry eye disease.Cornea.2019Mar;38(3):311-7.doi:10.1097/ICO.0000000000001854.

[22] Toth M and Jokić-Begić N. Psychological contribution to understanding the nature of dry eye disease: a cross-sectional study of anxiety sensitivity and dry eyes. Health Psychology and Behavioral Medicine.2020Jan;8(1):202-19.doi:10.1080/21642850.2020.1770093.

[23] Zhou Y, Murrough J, Yu Y, Roy N, Sayegh R, Asbell P *et al.* Association between depression and severity of dry eye symptoms, signs, and inflammatory markers in the DREAM study. Journal of the American Medical Association Ophthalmology. 2022 Apr; 140(4): 392-9. doi: 10.1001/jamaophthalmol.2022.0140.

[24] Nuzzi R and Caselgrandi P. Sex hormones and their effects on ocular disorders and pathophysiology: current aspects and our experience. International Journal of Molecular Sciences. 2022 Mar; 23(6): 3269. doi: 10.3390/ijms23063269.

[25] Basilious A, Xu CY, Malvankar-Mehta MS. Dry eye disease and psychiatric disorders: a systematic review and meta-analysis. European Journal of Ophthalmology.2022Jul;32(4):1872-89.doi:10.1177/11206721211060963.

[26] He Q, Chen Z, Xie C, Liu L, Wei R. The association between dry eye disease with depression, anxiety and sleep disturbance during COVID-19. Frontiers in Psychiatry.2022Jan;12:802302.doi:10.3389/fpsyt.2021.802302.

[27] Magno MS, Utheim TP, Snieder H, Hammond CJ, Vehof J. The relationship between dry eye and sleep quality. The Ocular Surface.2021Apr;20:13-9.doi:10.1016/j.jtos.2020.12.009.

[28] Ayaki M, Toda I, Tachi N, Negishi K, Tsubota K. Preliminary report of improved sleep quality in patients with dry eye disease after initiation of topical therapy. Neuropsychiatric Disease and Treatment.2016Feb:329-37.doi:10.2147/NDT.S94648