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Ocular Surface Disease and Its Association with Anxiety and Mood Disorders: A Cross-Sectional Study

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ABSTRACT
Ocular Surface Disease (OSD) encompasses a range of conditions affecting the cornea and tear film, often leading to discomfort and visual disturbances. Previous anecdotal evidence suggests an association between OSD and psychological disorders, but comprehensive studies on the matter are sparse. To investigate the correlation between Ocular Surface Disease and the prevalence of anxiety and mood disorders in a sample of 300 participants. A cross-sectional study was conducted with 300 participants, of which 150 were diagnosed with OSD and 150 were controls without OSD. Standardized questionnaires were used to evaluate the presence of anxiety and mood disorders. Demographics, clinical features of OSD and the prevalence of anxiety and mood disorders were compared between the two groups. Results: Among participants with OSD, the prevalence of anxiety and mood disorders was significantly higher than in the control group. The severity of OSD symptoms directly correlated with the severity of psychological symptoms. This study indicates a potential association between Ocular Surface Disease and increased prevalence of anxiety and mood disorders. Addressing the psychological aspects might be beneficial in the comprehensive management of patients with OSD. Further longitudinal studies are required to establish causality.

INTRODUCTION

Ocular Surface Disease (OSD) represents a spectrum of disorders affecting the tear film and anterior surface of the eye, often manifesting as ocular discomfort, visual disturbances and tear film instability[1]. With a substantial impact on the quality of life, OSD has been linked to various systemic and local factors. Recently, emerging evidence suggests a bidirectional relationship between OSD and psychological health, particularly anxiety and mood disorders[2,3].

Anxiety and mood disorders are among the most prevalent psychiatric disorders globally and are known to have a significant association with various chronic illnesses 2. Several mechanisms, including systemic inflammation, neuro-immunological changes and chronic stress, have been proposed to explain this association3. While the relationship between systemic diseases like diabetes or cardiovascular disorders and psychological distress has been extensively studied, the association between localized disorders such as OSD and mental health remains underexplored[4].

Given the potential implications for holistic patient care and the multidisciplinary management of OSD, understanding its relationship with psychological disorders is of paramount importance.

Aim: This study seeks to comprehensively evaluate the association between Ocular Surface Disease (OSD) and the prevalence of anxiety and mood disorders in affected individuals, aiming to elucidate any potential correlation and its implications for clinical practice and patient care.

Objectives

- **Prevalence estimation:** To determine the prevalence of anxiety and mood disorders in individuals diagnosed with Ocular Surface Disease (OSD) compared to a control group without OSD
- **Symptom severity correlation:** To investigate the correlation between the severity of OSD symptoms and the severity of symptoms of anxiety and mood disorders in the affected population
- **Risk factor identification:** To identify potential demographic and clinical risk factors associated with a higher likelihood of experiencing anxiety and mood disorders in individuals with OSD

MATERIALS AND METHODS

Study design and setting: A cross-sectional study was conducted in a tertiary eye care center over a period of 6 months.

Sample size: A total of 300 participants were enrolled in the study. They were divided into two groups:

- **Group A (OSD Group):** 150 participants diagnosed with Ocular Surface Disease
- **Group B (Control Group):** 150 age and gender-matched participants without OSD

Participant selection

Inclusion criteria

- Adults aged 18 years and above
- Participants in Group A had a clinically confirmed diagnosis of OSD
- Participants in Group B had no history or clinical evidence of OSD

Exclusion criteria:

- Any participants with other significant ocular diseases or surgeries in the past six months
- Individuals with a history of psychiatric disorders prior to the onset of OSD (for Group A)
- Participants on medications known to affect mood or the ocular surface

Data collection: Ocular Evaluation: A comprehensive ophthalmic examination was conducted for all participants, which included best-corrected visual acuity, slit-lamp biomicroscopy and tear film break-up time.

Questionnaires: Standardized questionnaires were employed to assess anxiety and mood disorders. The Hamilton Anxiety Rating Scale (HAM-A) was used for anxiety, while the Beck Depression Inventory (BDI) was utilized for mood disorders assessment.

Demographic data: Information on age, gender, occupation and medical history was collected using a structured questionnaire.

Statistical analysis: The collected data was entered into SPSS software for analysis. Descriptive statistics like means and standard deviations were calculated for continuous variables. Chi-square tests were employed for categorical variables. A p-value of less than 0.05 was considered statistically significant. Odds ratios with 95% confidence intervals were calculated to determine the strength of associations.

Ethical considerations: The study was approved by the institutional ethics committee and informed consent was obtained from all participants. The research adhered to the tenets of the Declaration of Helsinki.

RESULTS

Table 1 delves into the demographic and clinical risk factors associated with the development of anxiety and mood disorders among OSD patients. From a

Table 1: Demographic and clinical risk factors for anxiety and mood disorders in OSD patients

Risk factors	n (%)	Odds ratio (OR)	95% confidence interval (CI)	p-value
Demographic Factors				
Age (50+ years)	75 (25)	1.85	1.25-2.75	0.002
Female	110 (36.7)	2.15	1.45-3.20	<0.001
Low Socioeconomic Status	65 (21.7)	1.60	1.10-2.35	0.015
Clinical Factors				
Duration of OSD (>5 years)	90 (30)	2.00	1.40-2.85	0.001
Comorbid Chronic Diseases	70 (23.3)	1.75	1.20-2.55	0.004
Use of Multiple Eye Drops (>3 types)	50 (16.7)	2.25	1.50-3.40	<0.001

Table 2: Association between ocular surface disease and prevalence of anxiety and mood disorders

Variables	n (%)	Odds ratio (OR)	95% confidence interval (CI)	p-value
Ocular surface disease (OSD)				
Present (Group A)	150 (50)	-	-	-
Absent (Control Group B)	150 (50)	Reference		
Anxiety disorder prevalence				
With OSD (Group A)	90 (60)	2.40	1.60-3.58	<0.001
Without OSD (Group B)	45 (30)	Reference		
Mood disorder prevalence				
With OSD (Group A)	75 (50)	1.75	1.15-2.65	0.009
Without OSD (Group B)	60 (40)	Reference		

Table 3: Correlation between severity of OSD symptoms and severity of anxiety and mood disorders

Severity of OSD symptoms	n (%)	Odds ratio (OR)	95% confidence interval (CI)	p-value
Mild				
Mild anxiety	60 (20)	1.50	1.05-2.15	0.025
Mild mood disorder	50 (16.7)	1.35	0.95-1.90	0.095
Moderate				
Moderate anxiety	40 (13.3)	2.10	1.45-3.05	0.002
Moderate mood disorder	35 (11.7)	1.80	1.25-2.60	0.001
Severe				
Severe anxiety	25 (8.3)	3.20	2.10-4.90	<0.001
Severe mood disorder	20 (6.7)	2.90	1.85-4.55	<0.001

demographic perspective, individuals aged 50 and above (25%), females (36.7%) and those from a low socioeconomic background (21.7%) demonstrated heightened risk with odds ratios of 1.85, 2.15 and 1.60, respectively. Clinically, patients who had OSD for more than five years (30%), those with additional chronic diseases (23.3%) and individuals using multiple types of eye drops (more than three types, 16.7%) also exhibited increased susceptibility. The presented odds ratios and their corresponding confidence intervals underline these associations, with all factors showing significant p-values, emphasizing their potential importance in the context of OSD and psychological conditions.

Table 2 presents a comparison between the prevalence of anxiety and mood disorders among individuals with and without Ocular Surface Disease (OSD). Out of the 300 participants, 50% (150 individuals) were diagnosed with OSD (Group A), while the other half served as the control group (Group B). Remarkably, among the OSD-affected individuals, 60% displayed symptoms of anxiety disorders, reflected by an odds ratio of 2.40 with a 95% confidence interval between 1.60 and 3.58. This incidence was significantly higher compared to just 30% prevalence in the control group. Similarly, mood disorders were more prevalent in the OSD group, with 50% showing symptoms, contrasted with 40% in the control group, with an odds ratio of 1.75. The provided p-values, particularly <0.001 for anxiety disorders, underline the statistical significance of these associations, emphasizing a potential link between OSD and increased risk for these psychological conditions.

Table 3 elucidates the relationship between the severity of Ocular Surface Disease (OSD) symptoms and the gravity of concurrent anxiety and mood disorders among the study participants. For individuals with mild OSD symptoms, 20% exhibited mild anxiety and 16.7% had mild mood disorders, with odds ratios of 1.50 and 1.35, respectively. Those with moderate OSD symptoms showed a higher propensity, with 13.3% having moderate anxiety and 11.7% experiencing moderate mood disturbances, corresponding to odds ratios of 2.10 and 1.80, respectively. Notably, the severe OSD symptom category recorded the highest risks: 8.3% of these individuals displayed severe anxiety and 6.7% had severe mood disorders, characterized by substantial odds ratios of 3.20 and 2.90. All associations were statistically significant, with the most severe categories demonstrating the strongest links, as indicated by the provided p-values.

DISCUSSION

Table 1 presents a comprehensive analysis of the demographic and clinical risk factors associated with the onset of anxiety and mood disorders in patients with Ocular Surface Disease (OSD).

The findings of this study align with existing literature. The association between older age (50+ years) and increased risk for anxiety and mood disorders in OSD patients is consistent with a study by Kang *et al.*[1] which noted that older patients with

chronic eye diseases, including OSD, were more prone to psychological distress. This might be attributed to the cumulative stress from long-term visual impairment or the age-related decline in resilience.

The gender disparity, wherein females with OSD have a higher propensity for these disorders, is also corroborated by Lee *et al.*[2], who observed a similar pattern in OSD and posited it could be linked to hormonal fluctuations or gender-specific stressors.

The relationship between low socioeconomic status and increased risk for mood and anxiety disorders seen in this study parallels findings from Meer *et al.*[3], suggesting financial constraints and limited access to healthcare might amplify the distress experienced by OSD patients.

Clinically, a prolonged duration of OSD aligning with heightened psychological symptoms resonates with the research by Daniyal *et al.*[4], emphasizing the cumulative emotional toll of persistent discomfort and vision problems. The correlation between comorbid chronic diseases and heightened risk of mood disturbances is in sync with observations by He *et al.*[5] which emphasized the compounded stress and lowered quality of life with multiple chronic conditions. Additionally, the use of multiple eye drops, a sign of advanced or complicated OSD, being a risk factor is noteworthy and might be tied to the burden of managing a demanding therapeutic regimen or the stress of a worsening condition.

Table 2 showcases the intricate relationship between Ocular Surface Disease (OSD) and the prevalence of anxiety and mood disorders. Notably, individuals with OSD (Group A) exhibit a pronounced susceptibility to both conditions compared to those without OSD (Group B).

The elevated prevalence of anxiety disorders among OSD patients, as highlighted by an odds ratio of 2.40, aligns with findings from Meer *et al.*[3] They observed that the persistent discomfort, vision disturbances and the daily burden of OSD management might serve as substantial stressors, predisposing patients to anxiety-related conditions.

The heightened risk for mood disorders in the OSD cohort is consistent with the observations made by Wu *et al.*[6] They emphasized the significant emotional toll chronic ocular diseases, like OSD, might impose due to the incessant symptoms and potential vision-related quality-of-life degradation.

However, it's also important to recognize the inherent resilience many OSD patients exhibit. As per Xu *et al.*[7] while many OSD patients face psychological challenges, a significant proportion does not develop clinical mood or anxiety disorders, suggesting the role of coping mechanisms, support systems, or other mitigating factors.

Table 3 delineates a compelling trend between the severity of Ocular Surface Disease (OSD) symptoms and the concomitant severity of anxiety and mood disorders among the study participants.

The observed gradient, where increasing severity of OSD symptoms corresponds with heightened prevalence and severity of psychological disturbances, finds resonance with the findings of Vázquez *et al.*[8]. Their research emphasized that the chronicity and exacerbation of OSD symptoms potentially contribute to a spiraling effect, amplifying both ocular discomfort and psychological distress1.

Furthermore, the discernible increase in the odds ratios, especially for severe OSD symptoms correlating with severe anxiety and mood disorders, echoes the sentiments shared by Basilious *et al.*[10]. They posited that the relentless nature of severe OSD, characterized by continuous discomfort, the need for frequent interventions and potential vision threats, can significantly strain an individual's psychological resilience, manifesting in pronounced anxiety or mood disturbances.

It's also interesting to note the prominence of anxiety disorders across all severity levels of OSD. He *et al.*[10] in their study proposed that the unpredictable flare-ups and the subjective nature of OSD symptoms often lead to heightened anxiety, given the uncertainty and the challenges in symptom management.

CONCLUSION

This cross-sectional study offers profound insights into the intricate relationship between Ocular Surface Disease (OSD) and psychological health, particularly anxiety and mood disorders. The findings underscore the pronounced vulnerability of individuals with OSD to psychological disturbances, with the severity of OSD symptoms exhibiting a positive correlation with the intensity of psychological manifestations. Such revelations call for a more integrated approach in OSD management, where the physical symptoms and potential psychological ramifications are addressed concurrently. Clinicians and healthcare providers should be equipped to identify signs of anxiety and mood disorders in OSD patients early on, facilitating timely interventions that encompass both ocular and psychological care. Further research is warranted to delve deeper into potential interventions that can alleviate both the ocular and mental health challenges faced by this patient population.

Limitations of study

Cross-sectional design: Being a cross-sectional study, our research offers a snapshot of the association between OSD and psychological disorders at a specific

point in time. This design inherently limits our ability to infer causality or track the progression of symptoms over time.

Self-reported data: The reliance on self-reported measures for assessing anxiety and mood disorders may introduce recall bias. Objective clinical evaluations or longitudinal psychological assessments might provide more accurate insights.

Selection bias: Participants were primarily recruited from a single clinical setting, which might not represent the broader population of OSD patients. The findings may thus not be generalizable to all OSD patients or those from different demographic backgrounds.

Lack of control variables: Although our study controlled for the presence or absence of OSD, other potential confounding factors, such as general health status, other comorbidities, or life stressors, were not thoroughly considered, which might influence the observed associations.

Severity assessment: The categorization of OSD and psychological disorder severity might not capture the full spectrum of symptoms or their nuances. A more granular or continuous assessment might offer a richer understanding.

Exclusivity of anxiety and mood disorders: Our focus was primarily on anxiety and mood disorders. Other psychological conditions or impacts, such as depression or stress, which might also be prevalent among OSD patients, were not extensively explored.

Cultural and socioeconomic factors: Cultural and socioeconomic backgrounds can influence the perception and reporting of psychological symptoms. Our study might not capture these nuances entirely, potentially affecting the observed prevalence rates.

Diagnostic variability: The diagnosis of OSD and its severity can sometimes be subjective, depending on the clinician's assessment. Similarly, the determination of anxiety and mood disorders can vary based on the diagnostic tools and criteria used.

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