

## Prevalence of Dry Eye Disease among Patients with Depression in a Tertiary Care Teaching Hospital: A Descriptive Cross-Sectional Study

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### ABSTRACT

**Introduction:** Dry Eye Disease is one of the most common ocular diseases worldwide. This study aimed to determine the prevalence of Dry Eye Disease and its relationship with age group and gender among depression patients in a tertiary care teaching hospital.

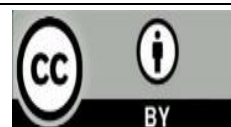
**Methods:** This was a cross-sectional study conducted among 84 patients of depression from June 2025 to November 2025. Standard proforma was used to collect socio-demographic variables. Ocular Surface Disease Index questionnaire was administered to assess the dry eye symptoms. Dry Eye Disease was diagnosed if the Ocular Surface Disease Index score was  $\geq 13$  and was further classified as mild (13-22), moderate (23-32) and severe (33-100). The statistical methods used were mean, frequency and percentage. Chi-square test was used to test the association between dry eye disease with age group and gender.

**Results:** The mean age of the study sample was 43.79 (SD $\pm$ 14.19) years. Females 63(75%) were predominant. The prevalence of Dry Eye Disease among depression patients was 29.76% (95% Confidence Interval: 20.27% - 40.73%). Among patients of Dry Eye Disease, mild 13(15.48%) was most prevalent, followed by moderate 10(11.9%) and severe 2(2.38%). Dry Eye Disease was significantly associated with gender but not with age group in depression patients.

**Conclusions:** The prevalence of Dry Eye Disease in depression patients was 29.76%. Female gender was the significant risk factor for Dry Eye Disease. Early diagnosis and treatment of Dry Eye Disease is essential to improve the quality and productivity of life in depression patients.

**Key words:** cross-sectional studies; depression; dry eye syndromes; prevalence.

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## INTRODUCTION

Dry Eye Disease is one of the most common ocular morbidities. Dry Eye Disease (DED) is a multifactorial disease of the tear film and ocular surface that results in symptoms of discomfort such as heaviness, grittiness, burning, dryness, foreign body sensation, visual disturbances and tear film instability. [1] Dry Eye Disease may impair the quality of life and daily activities. [2,3,4,5]

Depression is a major public health problem that affects patients and society. [6,7] Depression causes an enormous economic burden on society. [8] Depression is characterized by depressed mood, low self-esteem, thoughts of self-harm and suicide. [9] Different studies showed depression as a risk factor for Dry Eye Disease. [10,11]

The objective of this study was to find out the prevalence of Dry Eye Disease among the patients with depression. The second objective was to determine the association of Dry Eye Disease with age group and gender of depression patients in a tertiary care teaching hospital.

## METHODS

This was a hospital based, cross-sectional study conducted at Ophthalmology Outpatient Department (OPD) of Manipal Teaching Hospital, Pokhara, Nepal from June 2025 to November 2025. The study was conducted after obtaining ethical approval letter from Institutional Review Committee of the Manipal College of Medical Sciences, Pokhara (Reference number: MCOMS/IRC/640). The informed verbal and written consent was taken from all the patients.

The sample size was calculated by using the formula,  $n = 3.84 pq/d^2$  (Where,  $n$ =sample size,  $p$ =prevalence 32.2%, [12]  $q=100-32.2=83.8$ ,  $d$ =desired level of precision i.e., 10% for this study) Hence, 84 patients were included in this study. Non-probability purposive sampling method was used for the selection of the cases. The inclusion criteria were the depression patients of all age group of either gender presented to Ophthalmology OPD or referred from Psychiatric Department. The diagnosis of depressive episodes was made by Consultant Psychiatrist using International Classification of Diseases,

10th Revision, Diagnostic Criteria for Research (ICD-10 DCR). Patients who had other ocular disorders like conjunctivitis, corneal ulcer, history of ocular surgery, ocular trauma, contact lens, chronic medications like anti-glaucoma, antihypertensive, anti-histamines, hormonal medications and diuretics were excluded from the study. Patients who were already on antidepressant drugs and those patients who did not give consent were also excluded from the study.

Pre-designed proforma was used to collect sociodemographic and clinical variables of the patients. Detailed ocular examination including anterior and posterior segments was evaluated with slit lamp biomicroscopy.

Dry Eye Disease of all participants was assessed by the Ocular Surface Disease Index (OSDI) questionnaire. [13] It is a validated dry eye questionnaire, including 12 questions to assess ocular discomfort, visual symptoms and environmental factors. The OSDI questionnaire is graded on a scale from 0 to 4, where 0 indicates none of the time; 1, some of the time; 2, half of the time; 3, most of the time; and 4, all of the time.

The OSDI scoring is based on a 0-100 scale, with the highest score representing greater disability. Value to determine dry eye disease (DED) severity will be calculated using the given OSDI formula:

$$\text{OSDI} = \left[ \frac{(\text{sum of scores}) \times 100}{[(\text{Total number of questions answered}) \times 4]} \right]$$

Based on the total Ocular Surface Disease Index (0-100 points), each participant can be classified as normal (0–12 points). Dry eye disease was diagnosed if the Ocular Surface Disease Index score was  $\geq 13$  and dry eye disease was further classified as mild (13-22), moderate (23-32) and severe (33-100).

The data were entered and analyzed using Epi-info version 7. The statistical methods used were mean, frequency and percentage. Chi Square test was applied for statistical analysis. The p-value less than 0.05 were considered statistically significant.

## RESULTS

A total of 84 depression patients were enrolled in the study. The mean age of the sample was 43.79 (SD±14.19) years. Maximum patients were in the

age group of  $\leq 49$  years. Females 63 (75%) were predominant as compared to males 21 (25%). The prevalence of Dry Eye Disease among depression patients was 25 (29.76%) (95% Confidence Interval: 20.27% - 40.73%). Among patients of Dry Eye Disease, majority of the patients had mild dry eye 13 (15.48%), followed by moderate 10 (11.9%) and severe dry eye 2 (2.38%). (Table 1)

**Table 1: Frequency of demographic and clinical variables (n=84)**

| Demographic variables  |           | Frequency   |
|------------------------|-----------|-------------|
| Age (years)            | $\leq 49$ | 56 (66.67%) |
|                        | $\geq 50$ | 28 (33.33%) |
| Gender                 | Male      | 21 (25%)    |
|                        | Female    | 63 (75%)    |
| <b>Dry Eye Disease</b> |           |             |
| No                     |           | 59 (70.24%) |
| Yes                    |           | 25 (29.76%) |
|                        | Mild      | 13 (15.48%) |
|                        | Moderate  | 10 (11.9%)  |
|                        | Severe    | 2 (2.38%)   |

The prevalence of Dry Eye Disease was higher in age group  $\geq 50$  years (32.14%) compared to age group  $\leq 49$  years (28.57%), although this difference was not statistically significant. Regarding gender, the prevalence of Dry Eye Disease was higher in females (36.51%) than in

males (9.52%), and this difference was statistically significant. (Table 2)

**Table 2: Relationship between Dry Eye Disease with age group and gender (n=84)**

| Variables                 |           | Dry Eye Disease |                | Odds ratio | p-value |
|---------------------------|-----------|-----------------|----------------|------------|---------|
|                           |           | Yes             | No             |            |         |
| Age group (in years)<br>* | $\leq 49$ | 16<br>(28.57%)  | 40<br>(71.42%) | 0.84       | 0.73    |
|                           | $\geq 50$ | 9<br>(32.14%)   | 19<br>(67.86%) |            |         |
| Gender<br>**              | Female    | 23<br>(36.51%)  | 40<br>(63.49%) | 5.46       | 0.03    |
|                           | Male      | 2<br>(9.52%)    | 19<br>(90.48%) |            |         |

\*Chi-square value: 0.11

\*\*Chi-square value: 4.27

## DISCUSSION

Chronic stress and dysregulation of hypothalamic-pituitary-adrenal axis in depression may contribute to ocular surface inflammation and tear film instability. [1] Additionally, alteration in serotonin may play the role in the development of Dry Eye Disease (DED) in patients with depression. [14] Both the meibomian glands and conjunctiva have

serotonin receptor mRNA and serotonin has been shown to regulate lacrimal gland secretion. [15,16,17] Furthermore, elevated levels of inflammatory cytokines in patients with depression may further promote the onset and progression of Dry Eye Disease. [18]

In this study, the mean age of the study sample was 43.79 years. Several studies have reported a lower mean age compared to the findings of the present study, with reported mean ages of 41.3 years, 42.3 years, 41.36 years, 38.8 years, and 22.1 years respectively. [14,19,20,21,22] In contrast, other studies showed a higher mean age than that observed in the current study, reporting mean age of 61.3 years, 56.32 years and 49.9 years respectively. [23,24,25]

In the present study, no statistically significant association was found between age group and Dry Eye Disease among patients with depression. However, a study conducted in Madurai, India reported a significant association between Dry Eye Disease and age group. [20]

In the present study, the prevalence of Dry Eye Disease (DED) was higher among females than males. Consistent with our findings, several other

studies have also noted a higher prevalence of DED in females than in males. [14,19,20,21,22,23,25] Moreover, gender was found to be significantly associated with DED among patients with depression in our study population. Similarly, a study conducted in Madurai, India showed a significantly higher prevalence of DED among females compared to males. [20] The increased prevalence in females may be related to hormonal changes particularly those related to pregnancy, the use of hormonal therapies for contraception or infertility and post-menopausal androgen deficiency. [1] Furthermore, sex hormones are known to affect lacrimal gland, goblet cell function, meibomian gland and ocular surface sensitivity, all of which may contribute to the development and severity of dry eye symptoms. [26]

In our study, the prevalence of Dry Eye Disease (DED) was 29.76%. This prevalence was lower than that reported in several other studies conducted in Pakistan (31.09%), [22] Sinop, Turkey (38.18%), [25] Northern Kerala, India (50%), [24] Shanghai (60%), [10] Madurai, India (63.6%). [20] However, the prevalence observed

in our study was higher than that conducted in Nigde, Turkey which showed a Dry Eye Disease (DED) prevalence of 8.3%. [19]

In this study, mild DED (15.48%) was most prevalent followed by moderate DED (11.9%) and severe DED (2.38%) disease. In contrast, a study conducted in Pakistan reported a higher prevalence of moderate DED (13.5%), followed by mild DED (11.1%) and severe DED (6.5%). [22]

The variation in the prevalence of Dry Eye Disease (DED) across studies may be explained by the differences in the study populations and the diagnostic criteria used. Additionally, the antidepressant drugs are known to reduce tear secretion. [14] Another factor that may exacerbate DED symptoms is somatization, which is present in more than 80% of the individuals with depression. [27] However, in the present study, only patients with depression who were not receiving antidepressant drugs were included, which may explain the low prevalence of Dry Eye Disease observed.

There are a few limitations in the present study. Its cross-sectional design precludes the

establishment of a causal relationship between Dry Eye Disease and depression. Additionally, the use of non-probability purposive sampling may have introduced selection bias and limited the external validity of the findings. Furthermore, clinical diagnostic tests for dry eye were not performed. Therefore, further studies employing analytical research designs and incorporating clinical diagnostic tests for dry eye are recommended to validate and strengthen these findings.

## CONCLUSIONS

The prevalence of Dry Eye Disease among patients with depression was 29.76%. Female gender was the significant risk factor for Dry Eye Disease. Therefore, all the patients with depression should be screened for Dry Eye Disease as a part of comprehensive approach. Collaboration between psychiatrist and ophthalmologist may facilitate early diagnosis and effective treatment of both ocular and mental health to improve the quality and productivity of life.

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## CONFLICT OF INTEREST

None

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None

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