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# Depression, anxiety, stress, and dry eye disease among Gazan undergraduate health sciences and nursing students: a structural equation modeling study

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Abstract

Purpose: To investigate associations between dry eye disease (DED) symptoms and psychological distress (depression, anxiety, stress) among undergraduate health sciences and nursing students in the Gaza Strip during the 2023-2025 conflict period. Methods: A cross-sectional study used convenience sampling via WhatsApp and face-to-face interviews between 4 February and 29 April 2025. Participants completed a demographic form, the Arabic Ocular Surface Disease Index (OSDI), and the Arabic Depression Anxiety Stress Scale-8 (DASS-8). Analyses included descriptive statistics, group comparisons, correlations, and structural equation modeling (SEM) with interaction terms; sex was included as a covariate, and academic year was examined as an exploratory moderator

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of distress-symptom associations. Results: Data from 282 students (190 female, 92 male) were analyzed. OSDI scores were skewed upward (median 25.0, IQR 16.67-33.33). Using OSDI > 12, symptomatic DED prevalence was 87.9 %. OSDI correlated with depression ( $r = 0.37$ ), anxiety ( $r = 0.44$ ), and stress ( $r = 0.56$ ), all  $p < 0.001$ . SEM indicated a stronger unique association for stress and a smaller, significant association for depression; moderation by academic year was not statistically significant. The classifier achieved good discrimination for symptomatic status (AUC = 0.829). Conclusion: Among Gazan health sciences and nursing students, DED symptoms were common and associated with psychological distress-particularly stress and, to a lesser extent, depression. Sex and academic year did not show robust effects. Findings support considering mental health within DED management for students in conflict settings.

**Keywords**

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