Brief Report

Prevalence and Clinical Assessment of Dry Eyes in Lebanon

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Abstract

This cross-sectional prospective cohort study investigates the clinical prevalence of dry eye disease (DED) in Lebanon. It is the first clinical study of its kind in Lebanon. Using the Ocular Surface Disease Index (OSDI) questionnaire, patients initially underwent symptoms evaluation. Following this, participants received comprehensive ocular examinations, including the Tear Film Break-Up Time (TBUT), ocular surface staining, Schirmer's test, and assessment of Meibomian gland quality and expressibility.

Our findings indicate a high prevalence of DED, with 73.9% of participants exhibiting symptoms, stratified into mild (32.4%), moderate (19.7%), and severe (47.9%) cases. The mean OSDI score was 33.31 (SD = 14.77). TBUT measurements averaged 6.5 and 6.85 in the right and left eyes, respectively. Ocular surface staining among DED patients was graded across four levels, with most eyes classified between Grades 1 and 3. Schirmer's test results showed reductions of 20% in the right eye and 31% in the left eye. Analysis of Meibomian gland quality and expressibility revealed that Grade 0 was present in 52.1% of cases, Grade 1 in 36.6%, and Grade 2 in 11.3%.

Our study identified smoking, contact lens use, and dyslipidemia as prevalent associated conditions, with a statistically significant association between these factors and DED ($p < 0.001$). Overall, our results confirm a high prevalence of DED in the Lebanese population, with modifiable risk factors that contribute to disease onset and severity.

Keywords: *dry eye disease, aqueous-deficient dry eye, evaporative dry eye.*

Introduction

The Tear Film and Ocular Surface Society (TFOS) defines dry eye disease (DED) as a "multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, accompanied by ocular symptoms, in which tear film instability, hyperosmolarity, inflammation, and neurosensory abnormalities play etiological roles" (Craig *et al.*, 2017). DED is commonly classified by etiology into two primary categories: aqueous-deficient dry eye (ADDE) and evaporative dry eye (EDE). (Nelson *et al.*, 2017). TFOS DEWS II recommends using various diagnostic tests for dry eye screening, such as the Ocular Surface Disease Index (OSDI) questionnaire, Tear Film Break-Up Time (TBUT), Schirmer test, and assessments of Meibomian gland function and ocular surface staining (Craig *et al.*, 2017).

The prevalence varies significantly depending on geographical location, climate, and population demographics. For instance, a comprehensive meta-analysis estimated that 5-50% of the global population suffers from DED (Stapleton *et al.*, 2017). Studies in the Middle East suggest even higher prevalence rates due to environmental factors, such as high temperatures, dry climates, and air pollution, which exacerbate tear film evaporation and ocular surface irritation (Alkabbani, *et al.*, 2019). In Lebanon, Sherry *et al.* (2019) reported that 36.4% of adults experience dry eye symptoms, assessed via OSDI. A separate study conducted in Dubai in 2019

found a prevalence of 62.6%, with the highest severity among participants experiencing extended screen time and frequent cosmetic use (Alkabbani, *et al.*, 2019).

Materials and Methods

This study is a cross-sectional clinical assessment of DED prevalence in Lebanon, involving a questionnaire-based (OSDI) symptoms evaluation, followed by clinical assessments using TBUT, ocular surface staining, Schirmer's test, and Meibomian gland evaluation. Effective diagnosis of DED relies on a combination of a positive OSDI score and positive value on either TBUT and/or ocular surface staining. Further assessment of tear production is evaluated by Schirmer's test and meibomian gland was assessed using Meibomian gland quality and expressibility.

The study included Lebanese adults aged 18 years and older, with exclusion criteria comprising active eye infections, recent eye surgeries, use of medications like tear supplements, and history of ocular pathology that could interfere with tear production.

Results and Discussion

The study analyzed a sample of 95 Lebanese adults to determine the prevalence and severity of dry eye disease (DED) and assess its

association with various risk factors. Overall, 73.9% (n = 71) of participants were classified as having DED.

The severity of DED based on OSDI was distributed as follows: mild cases accounted for 32.4%, moderate cases for 19.7%, and severe cases for 47.9%.

OSDI scores revealed significant differences between the DED and non-DED groups. The mean OSDI score among individuals with DED was 33.31 (SD = 14.77), contrasting with a much lower mean score of 5.25 (SD = 3.11) in those without DED.

TBUT was also markedly reduced in the DED group, with average values of 6.5 seconds (OD) and 6.85 seconds (OS), compared to 9 seconds (OD) and 8.63 seconds (OS) in the non-DED group.

Schirmer test results indicated tear production deficits in participants with DED, with a 20% reduction in the right eye and a 31% reduction in the left eye.

Meibomian gland quality and expressibility assessment showed varying levels of gland secretion quality, which correlated with DED severity. DED patients showed 52.1% grade 0, 36.6% with grade 1, and 11.3% with grade 2.

To further analyze associations between DED and potential risk factors, we conducted a chi-square test, which revealed a strong statistical association between DED and factors like smoking, contact lens use, and dyslipidemia ($p < 0.001$).

This is the first clinical study done to assess dry eye prevalence in Lebanon. The distribution of dry eye indicates that nearly half of those diagnosed with DED experienced severe symptoms (47.9%), highlighting the substantial impact and the symptoms burden of the disease on this population. The 25% average reduction of TBUT indicates increased tear film instability which also gives a possible explanation to the patients experienced symptoms. In addition, the 25% average Schirmer's test reduction and the cumulative 47.9% meibomian gland poor quality secretions also contributed to tear film instability and patients' symptomatology.

Conclusion

This study confirms a high prevalence of DED among Lebanese adults, with smoking, contact lens use, and dyslipidemia identified as significant risk factors. DED is a common condition with significant variability in prevalence across regions and populations. In the Middle East, factors such as high temperatures, smoking prevalence, and frequent cosmetic use appear to elevate the risk for. Further research is necessary to explore the interactions between these risk factors, especially in rapidly urbanizing and digitally engaged populations, where DED prevalence may continue to rise. Our findings underscore the need for increased awareness and screening, particularly for high-risk groups such as smokers and contact lens users.

Declarations

Ethics Approval

Not Applicable

Conflicts of Interest

No conflict of interest exists

Funding Statement

Data Availability

All the data is available on the corresponding author upon a responsible request.

Acknowledgement

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