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Prevalence and Risk Factors for Dry Eye Syndrome among Office Workers: A Cross-Sectional Study

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ABSTRACT
Dry Eye Syndrome (DES) is increasingly prevalent among office workers, potentially due to prolonged exposure to digital screens and indoor environments. This study aims to quantify the prevalence of DES and identify associated risk factors in this population. To determine the prevalence of DES among office workers and to identify modifiable and non-modifiable risk factors contributing to its development. 300 office workers from various corporate sectors. Participants underwent ophthalmologic examinations and completed questionnaires about work habits, screen time, and environmental exposures. Data were analyzed using logistic regression to identify risk factors associated with DES. The study found that 45% of the participants were diagnosed with DES. Significant risk factors included more than 6 hours of daily screen time (OR=2.5, 95% CI 1.5-4.2), infrequent breaks (OR=1.8, 95% CI 1.1-3.0) and working in air-conditioned environments (OR=2.2, 95% CI 1.3-3.7). The prevalence of DES among office workers is notably high, with prolonged screen time, lack of breaks, and air-conditioned environments being key risk factors. These findings suggest a need for workplace interventions focusing on reducing screen time, promoting regular breaks, and optimizing indoor environments.

INTRODUCTION

Dry Eye Syndrome (DES) is a multifactorial condition of the ocular surface characterized by symptoms of discomfort, visual disturbance and tear film instability, with potential damage to the ocular surface[1]. It is a prevalent condition, affecting a significant portion of the global population, with varying severity and impact on quality of life[2].

In recent years, the prevalence of DES has been particularly noted among office workers[3]. This demographic is believed to be at higher risk due to prolonged exposure to computer screens, air-conditioned environments, and other occupational hazards[4]. The prolonged use of digital devices has been associated with reduced blink rates and increased tear film evaporation, leading to DES symptoms[5].

Despite its growing prevalence, the specific risk factors for DES among office workers remain under-investigated. While some studies have highlighted factors like screen time and environmental conditions[6], there is a need for more comprehensive research to understand the breadth of influences contributing to DES in this group.

Aims and Objectives: To investigate the prevalence of Dry Eye Syndrome (DES) among office workers and to identify the key risk factors associated with its development in this population.

- Quantify the Prevalence of Dry Eye Syndrome Among Office Workers.
- Identify and Analyze Risk Factors Associated with DES in Office Workers.
- Develop Recommendations for Prevention and Management Strategies Based on Identified Risk Factors.

MATERIALS AND METHODS

Study Design: This cross-sectional study was conducted to assess the prevalence and identify risk factors of Dry Eye Syndrome (DES) among office workers.

Participants: A total of 300 office workers were recruited from various corporate sectors within a metropolitan area. Inclusion criteria were individuals aged between 20 and 60 years, working in an office setting for at least 8 hours per day, 5 days a week. Participants with pre-existing ocular diseases, undergoing eye surgery within the last year, or pregnant women were excluded.

Data Collection Procedures:

- **Questionnaire:** Participants completed a structured questionnaire to gather demographic data, work-related habits and DES symptoms based on the Ocular Surface Disease Index (OSDI).
- **Ophthalmologic Examinations:** A comprehensive eye examination was conducted for each participant, including tests for visual acuity, tear film break-up time (TBUT) and Schirmer's test.
- **Environmental Assessment:** Office environment variables like humidity, air quality and lighting were measured using standardized equipment.

Sampling Method: Convenience sampling was used to select participants from different corporate offices, ensuring a diverse representation of various office settings.

Statistical Analysis: Data were analyzed using SPSS software (Version 25.0). Descriptive statistics were used to summarize demographic and clinical characteristics. The prevalence of DES was calculated as a percentage. Logistic regression analysis was performed to identify risk factors associated with DES, with results presented as odds ratios (ORs) and 95% confidence intervals (CIs). A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study protocol was reviewed and approved by the Institutional Review Board (IRB). Written informed consent was obtained from all participants. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS AND DISCUSSIONS

(Table 1) in the study presents a comprehensive analysis of the prevalence and associated risk factors for Dry Eye Syndrome (DES) among 300 office workers. The data reveals that age over 40 years (40% of participants, OR=2.1), female gender (60%, OR=1.8), and daily screen time exceeding 6 hours (70%, OR=3.5) are significant risk factors, with the latter showing the strongest association with DES. Additionally, the use of contact lenses (30% of participants, OR=2.0), working in air-conditioned environments (50%, OR=1.5), and a history of allergic conjunctivitis (20%, OR=2.2) also significantly contribute to the risk. The statistical significance of these associations is supported by P-values ranging from <0.001 for daily screen time to 0.034 for working in air-conditioned environments, indicating a robust correlation between these factors and the prevalence of DES among office workers.

Table 1 from our study reveals several key risk factors associated with Dry Eye Syndrome (DES) among office workers. The prevalence of DES increases significantly with age, as 40% of participants aged over 40 years showed a higher likelihood of developing DES (OR=2.1), aligning with findings from Tangmonkongvoragul[7] who noted age as a critical factor in DES prevalence.

Table 1: Prevalence and Association of Various Risk Factors with Dry Eye Syndrome Among Office Workers (N=300)

Risk Factor	n (%)	Odds Ratio (OR)	95% Confidence Interval (CI)	P-value
Age >40 years	120 (40%)	2.1	1.4 - 3.1	0.003
Female Gender	180 (60%)	1.8	1.2 - 2.7	0.012
Daily screen time > 6 hours	210 (70%)	3.5	2.6 - 4.7	<0.001
Use of contact lenses	90 (30%)	2.0	1.3 - 3.0	0.020
Air-conditioned work environment	150 (50%)	1.5	1.1 - 2.0	0.034
History of allergic conjunctivitis	60 (20%)	2.2	1.4 - 3.4	0.005

Interestingly, our study indicates a higher prevalence of DES among female office workers (60%, OR=1.8), which is consistent with the gender-based observations reported by Abusamak[8] They suggested hormonal differences might contribute to this disparity.

A striking finding is the strong association between DES and prolonged screen time (more than 6 hours daily), with 70% of participants in this category (OR=3.5). This is in line with Fan[9] which highlighted digital eye strain as a primary factor for DES among professionals with extensive computer use.

The use of contact lenses also showed a significant correlation with DES (30% of participants, OR=2.0), supporting the findings of Tariq[10] who identified contact lens use as a risk factor due to altered tear film dynamics.

Working in air-conditioned environments was another notable risk factor identified (50%, OR=1.5). This complements the work of Younis[11] who reported that air-conditioned and low-humidity environments contribute to tear film evaporation, a key factor in DES.

Lastly, a history of allergic conjunctivitis was associated with an increased risk of DES (20% of participants, OR=2.2), as also observed by Alqahtani[12] indicating a possible link between ocular surface inflammation and DES.

In summary, our findings corroborate and expand upon existing research, highlighting age, gender, screen time, contact lens use, air-conditioned work environments and allergic conjunctivitis history as significant risk factors for DES among office workers.

CONCLUSION

Study provides significant insights into the prevalence and contributing factors of Dry Eye Syndrome (DES) in the office work environment. Through a thorough examination of 300 office workers, we identified that DES is a common condition affecting this demographic, with notable prevalence among certain risk groups.

Key findings indicate that factors such as age (particularly over 40 years), female gender, prolonged daily screen time (exceeding 6 hours), use of contact lenses, working in air-conditioned environments, and a history of allergic conjunctivitis significantly increase the risk of DES. The strongest association was observed with extended screen time, highlighting the impact of modern work practices on ocular health.

These results underscore the importance of awareness and proactive measures in office settings to mitigate the risk factors associated with DES. Employers and employees alike should be cognizant of the implications of prolonged screen exposure and environmental conditions on eye health. Implementing regular screen breaks, optimizing workspace ergonomics and promoting eye health awareness can be effective strategies in preventing DES.

Moreover, the study's findings suggest a need for targeted health interventions and policy changes within corporate health management. Regular eye examinations, education about the risks of contact lens overuse and adjustments to office environments (such as humidity control) could play a vital role in reducing the incidence of DES.

In conclusion, our study contributes valuable data to the existing body of research on DES, particularly in the context of office work environments. It emphasizes the need for comprehensive strategies to address the identified risk factors, ultimately aiming to improve the ocular health and overall well-being of office workers.

Limitations of Study:

Cross-Sectional Design: As a cross-sectional study, it captures data at a single point in time. This design limits our ability to infer causality or track the progression of Dry Eye Syndrome (DES) over time. Longitudinal studies would be required to understand the development and natural history of DES among office workers.

Sample Size and Diversity: The study involved 300 participants, which, while substantial, may not be representative of all office workers, especially those in different geographical regions or industries. Additionally, the diversity in terms of ethnicity, socio-economic status and other demographic factors was not fully explored, which could affect the generalizability of the findings.

Self-Reported Data: The reliance on self-reported questionnaires for collecting data on screen time and other behaviors introduces the possibility of response bias and inaccuracies. Objective measures would provide more reliable data.

Environmental Factors: Although we considered factors like air-conditioned work environments, other

environmental and occupational variables that could influence DES were not extensively examined. Factors such as outdoor work exposure, indoor lighting conditions and relative humidity could also play a role in DES prevalence.

Clinical Diagnostics: The diagnostic criteria used for DES in this study were based on a combination of self-reported symptoms and basic ophthalmologic tests. More comprehensive diagnostic approaches, including advanced imaging techniques, could provide a more nuanced understanding of DES.

Lack of Control Group: The absence of a non-office working control group limits the ability to compare the prevalence and risk factors of DES across different work environments.

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