OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences

Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) | ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article **Ophthalmology**

Preferred Diagnostic Tests for Assessing Tear Film and Dry Eye Among Eye Care Practitioners in Saudi Arabia

Fatimah Mohammad Albanawi[1*], Ahmed Abdulwhab Alkishi[2], Ibrahim Zekeria Khater[3], Sharaf Hussein Alim[4], Mohammed Abdullah Alqarni[5], Mohammed Saleh Al-Mutairi[5], Mohammed Manaa Alotaibi[5], Hamzah Ahmed Alqarni[5], Muneer Marzouq Alotaibi[5]

[1]Senior Optometrist, Surgery Department, Armed Forces Hospital, Jubail, Saudi Arabia
[2]Optometrist, Surgery Department, Armed Forces Hospital, Jubail, Saudi Arabia
[3]Consultant Ophthalmologist, Surgery Department, Armed Forces Hospital, Jubail, Saudi Arabia
[4]Optical technician, Ophthalmology Department, Armed Forces Hospital, Al-Hada, Saudi Arabia
[5]Optical technician, Ophthalmology Department, King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia

DOI: https://doi.org/10.36348/sjmps.2025.v11i11.020 | **Received:** 03.10.2025 | **Accepted:** 25.11.2025 | **Published:** 29.11.2025

***Corresponding author:** Fatimah Mohammad Albanawi
Senior Optometrist, Surgery Department, Armed Forces Hospital, Jubail, Saudi Arabia

Abstract

This study aimed to evaluate the diagnostic tests and management approaches for dry eye disease (DED) among eye care practitioners in Saudi Arabia. A cross-sectional, questionnaire-based survey was sent to 200 practitioners, with 88 responses, resulting in a 44% response rate. Of the respondents, 68.2% were optometrists and 31.8% were ophthalmologists. The fluorescein tear break-up time (TBUT) and Schirmer test were the most commonly used diagnostic methods due to their simplicity and accessibility, while assessing the meibomian glands was less frequent. The main causes of DED identified were environmental factors and meibomian gland dysfunction. The most commonly reported symptoms included dry eyes, tearing, and itching. The preferred management options were aqueous-based artificial tears (46.3%) and lipid-based artificial tears (40.1%), with minimal use of advanced therapies. These findings underscore the reliance on conventional diagnostic and treatment methods and highlight the need for standardized protocols and broader adoption of modern diagnostic technologies to improve DED care in Saudi Arabia.

Keywords: Dry eye disease; diagnostic tests; fluorescein break-up time; artificial tears; Meibomian gland dysfunction.

Copyright © 2025 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

1. INTRODUCTION

Dry eye disease (DED) is a condition in which the eyes either fail to produce an adequate amount of tears or the tears evaporate too quickly, leading to damage of the ocular surface and discomfort (Lemp & Benitez-Del-Castillo, 2013). The Tear Film and Ocular Surface Society (TFOS) Dry Eye Workshop II Epidemiology Report (2017) indicated that, depending on the study population and diagnostic techniques used, the global prevalence of dry eye ranges from 5% to 50% (Stapleton *et al.*,2017).

Tear deficiency, whether qualitative or quantitative, causes instability and hyperosmolarity of the tear film in DED. These alterations occur due to dysfunction in the ocular structures responsible for tear production and regulation, including the cornea, conjunctiva, meibomian glands, and lacrimal glands. An inflammatory cycle is thereby formed, which causes the ocular surface to get damaged progressively and the quality of life and vision of the patients to get worse (Sheppard *et al.*,2022). DED can arise from several factors, such as systemic or ocular diseases, systemic or topical medications, and environmental conditions (Sheppard *et al.*,2022).

Currently, the diagnostic techniques used for dry eye evaluation may target only one or several aspects of the disease. Therefore, multiple objective tests are often required to achieve an accurate diagnosis. However, no universally standardized protocol exists for clinicians to follow with absolute certainty (Graham *et al.*,2009). The wide range of available diagnostic tests has contributed to variation in clinical use, as shown by previous questionnaire-based studies (Turner *et al.*,2005).

Few studies have been conducted in Saudi Arabia to determine the most commonly used diagnostic tests and treatment approaches among eye care practitioners for dry eye disease. Therefore, this study aimed to identify the preferred diagnostic methods used by optometrists and ophthalmologists in Saudi Arabia for evaluating dry eye syndrome and tear film stability.

2. MATERIALS AND METHODS

This cross-sectional study included clinical optometrists and ophthalmologists working in different hospitals across Saudi Arabia (n = 88). Data were collected between February and April 2024 using a structured questionnaire distributed through WhatsApp and LinkedIn networks. The survey was designed using Google Forms and consisted of 12 multiple-choice questions with options allowing multiple responses. The main goal of the study was to evaluate the knowledge and practices of eye-care professionals regarding dry-eye disease (DED).

It was completely voluntary to participate, and the estimated time to complete the questionnaire was around five minutes. The data obtained were transferred to Microsoft® Office Excel for further analysis. Descriptive statistics were applied, and the findings were displayed in the form of percentages.

Inclusion Criteria

The participants were supposed to be licensed eye-care practitioners who were authorized to examine and treat eye conditions through optometry or ophthalmology in Saudi Arabia. All optometrists had a Bachelor's degree in Clinical Optometry, while all ophthalmologists had a degree in Medicine and Surgery.

Exclusion Criteria

Responses that were not complete or were submitted multiple times were eliminated from the analysis. Moreover, people who had no valid clinical registration or were not currently practicing in Saudi Arabia were also excluded.

Ethical Considerations

This study did not require ethical approval, as it was an anonymous online survey that was voluntary and without any patient data or clinical intervention. The participation was completely voluntary, and the anonymity of the respondents was preserved throughout the process.

3. RESULTS AND DISCUSSION

3.1 Results

The distribution of respondents indicated that 68.2% were optometrists and 31.8% were ophthalmologists, which substantiates the preponderance of optometrists in the management of dry eye disease (DED) in Saudi Arabia. The majority of the respondents were from the Central Region (42%) and the Eastern Region (36.4%), while the rest came from the Western (9.1%), Northern (6.9%), and Southern (5.7%) regions. Such a regional distribution reflects the healthcare and educational institutions being mainly located in the central and eastern parts of the country. The participation based on gender had about the same ratio, with 56.8% males and 43.2% females.

Environmental conditions were the most common reason for DED reported (29.3%), followed by meibomian gland dysfunction (24.4%), age (19.1%), allergic conjunctivitis or air conditioning exposure (17.3%), and wearing contact lenses (9.8%) (**Figure 1**).

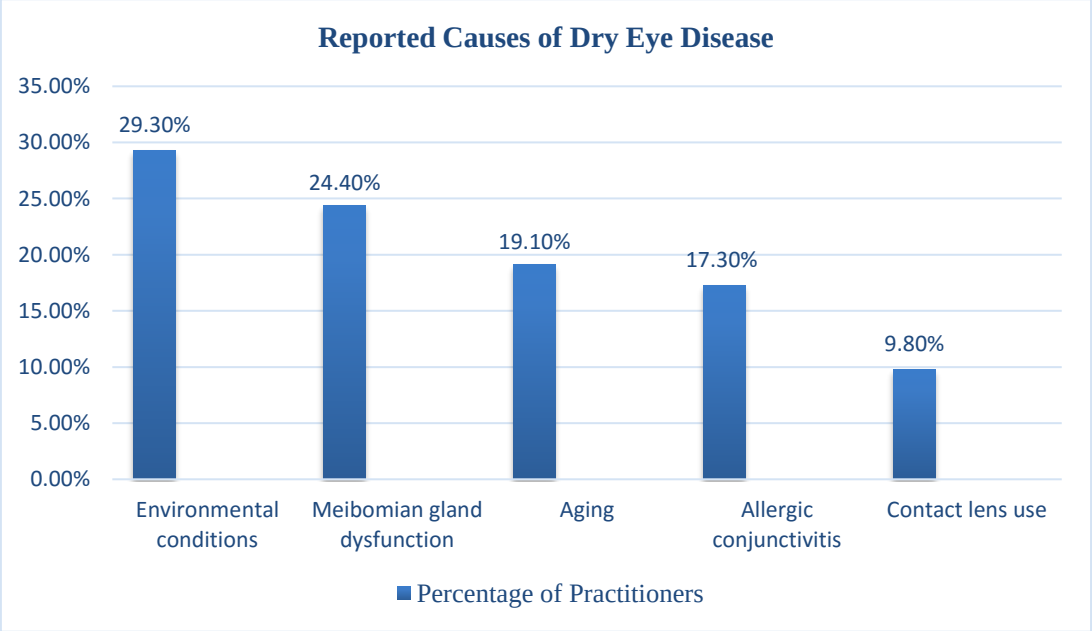

Figure1: Reported causes of dry eye disease among eye care practitioners in Saudi Arabia

Dryness (23.5%), tearing (22.8%), itching (20.1%), burning or stinging (18.4%), and ocular discomfort or pain (15.3%) were the most frequently observed symptoms (**Figure 2**).

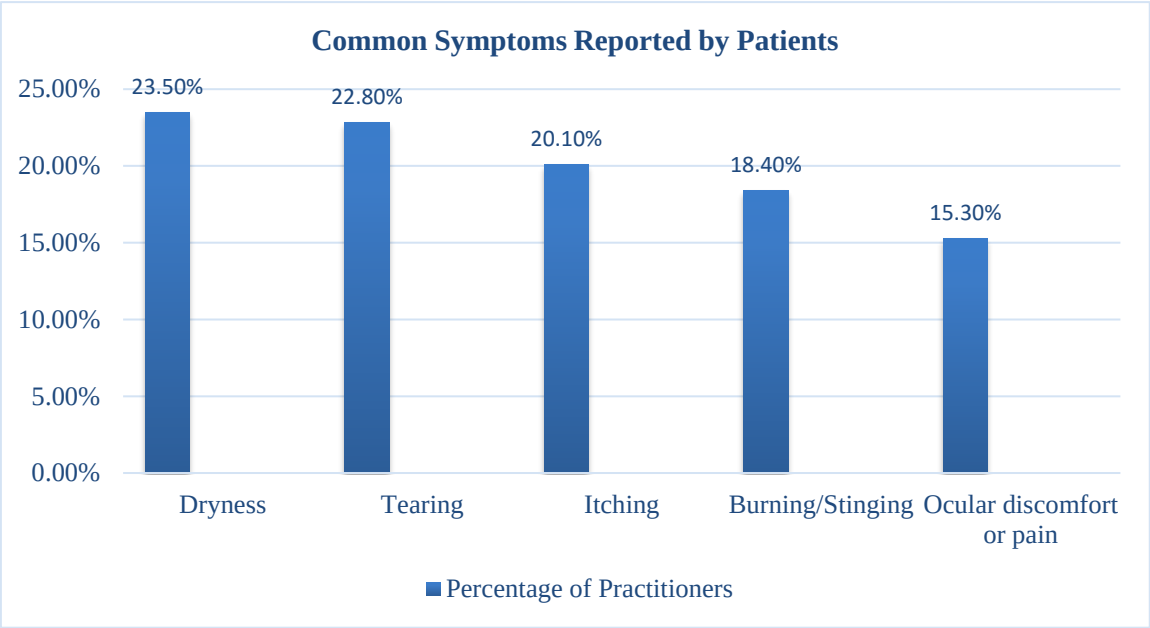

Figure 2: Common symptoms reported by patients with dry eye disease as perceived by eye care practitioners in Saudi Arabia

In terms of diagnostic approaches, the fluorescein tear break-up time (TBUT) was the most performed test (29.5%), followed by the Schirmer test (22.2%), fluorescein staining (16.9%), tear meniscus height assessment (16.4%), and meibomian gland evaluation (15%), as shown in **Figure 3**.

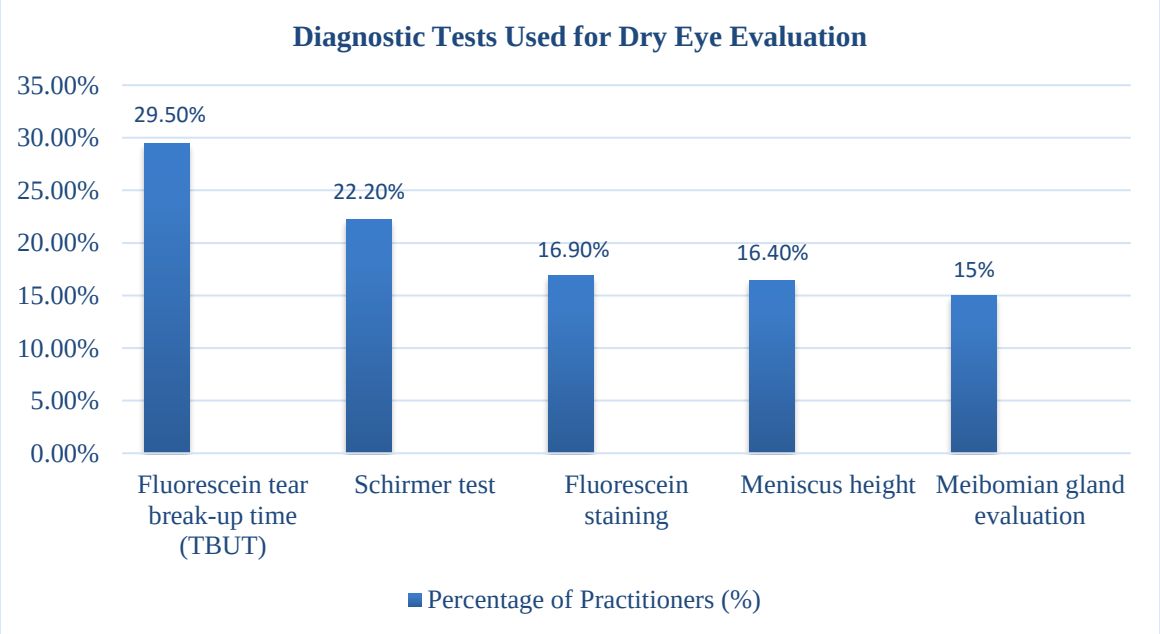

Figure 3: Diagnostic tests used for the evaluation of dry eye disease among eye care practitioners in Saudi Arabia

As far as management is concerned, the first line of treatment was aqueous-based artificial tears (46.3%) and lipid-based artificial tears (40.1%). Punctal plugs (12.2%), warm compresses (0.7%), and artificial tear supplements (0.7%) were also among the treatment options, but in a smaller percentage (**Figure 4**).

© 2025 | Published by Scholars Middle East Publishers, Dubai, United Arab Emirates

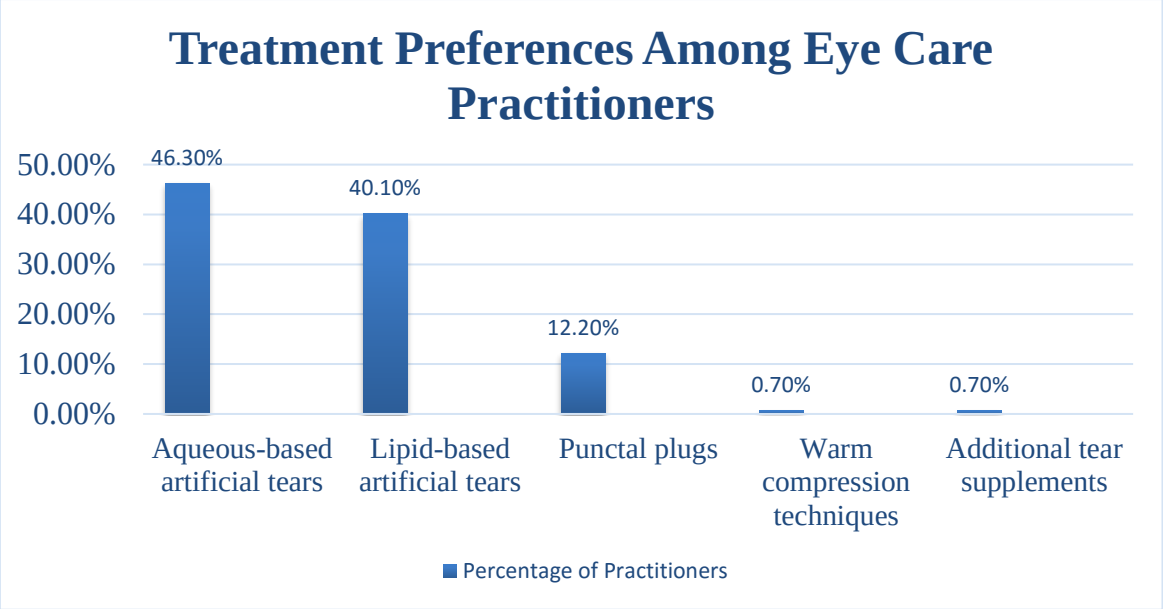

Figure 4: Treatment preferences among eye care practitioners for managing dry eye disease

The current study results indicate that DED management in Saudi Arabia still heavily relies on the conventional approaches of diagnosis and artificial tear therapy. This not only shows the practicality of these methods but also the need for the widespread adoption of standard diagnostic protocols and advanced imaging procedures like non-invasive TBUT and meibography. There is a need for training programs dedicated to meibomian gland dysfunction and evaporative DED to improve diagnostic precision and treatment success. Researchers should correlate the diagnostic decisions of practitioners with patient outcomes and investigate barriers to the application of dry eye care that follows the latest evidence.

3.2 DISCUSSION

The primary objective of the research was to determine the diagnostic tests favored by eye care practitioners in Saudi Arabia for the assessment of the tear film and the diagnosis of dry eye disease (DED). The study results pointed towards a

strong preference for the classic diagnostic methods, mainly fluorescein tear break-up time (TBUT), which was the most used method (29.5%) in the count, then Schirmer test (22.2%), fluorescein staining (16.9%), tears meniscus height assessment (16.4%), and meibomian glands evaluation (15%). Such results imply that DED diagnosis in Saudi Arabia is still based mostly on methods that are low-cost, easily accessible, and clinically practicable.

The trend of TBUT and Schirmer's test usage was the same when compared to international and regional studies, which documented similar user preference for traditional techniques due to their simplicity and low cost (Turner *et al.*,2005; Graham *et al.*,2009). On the other hand, the 15% rate of meibomian gland evaluation shows the limitations in DED diagnostics, especially for evaporative DED, which is common in hot, dry places like Saudi Arabia. A similar situation was noted in other developing countries like Ghana, where the study by Asiedu *et al.,* (2016) reported that more than 80% of doctors were mainly relying on TBUT and Schirmer's test.

Additionally, it was noted that the environmental factors were the most prevalent, when 29.3% of the doctors listed environmental circumstances as the main cause of DED, then meibomian gland dysfunction (24.4%), old age (19.1%), allergic conjunctivitis or air-conditioning exposure (17.3%), and contact lens wearing (9.8%). The findings align with national epidemiological reports, which explain that the extreme climates and the use of air conditioning are the major reasons behind the high rate of DED in Saudi Arabia (Alkhaldi *et al.*,2022; Helayel *et al.*,2023). This indicates that researchers are right in thinking that environmental and evaporative factors are the main reasons for the eye surface being unstable in the Kingdom.

The environmental aspect of the DED causation was dominant; still, the majority of the eye care specialists among the study group chose the tests based on tears (TBUT and Schirmer) instead of the tests focused on meibomian glands. There was thus a gap between the causes of DED and the methods of diagnosing it. Since evaporative DED, which is mostly caused by meibomian gland dysfunction, the underuse of gland health checks may lead to underdiagnosis or inappropriate management of the condition.

Dryness (23.5%), tearing (22.8%), itching (20.1%), and burning or stinging sensations (18.4%) were reported as the most frequent symptoms by

practitioners. The reporting of symptom types matches the local and international studies, among others, Alharbi *et al.,* (2024), who mentioned that ocular dryness and irritation still are the most common complaints among Saudi patients, and Asiedu *et al.,* (2016) where burning (33.8%) and foreign body sensation (22.5%) were highlighted as the major symptoms among Ghanaian patients.

In terms of management preferences, the most prescribed treatment options were aqueous-based artificial tears (46.3%) and lipid-based artificial tears (40.1%), while punctal plugs (12.2%), warm compresses (0.7%), and artificial tear supplements (0.7%) were hardly used. These results are similar to those of the other Saudi studies, where the use of artificial tears was still the first-line treatment for DED (Binyousef *et al.*,2021; AlSomali *et al.*,2023). Nevertheless, newer therapeutic options like anti-inflammatory drops (e.g., cyclosporine), intense pulse light (IPL), and meibomian gland therapy are still not much used in the local areas, although their effectiveness in the treatment of evaporative DED has been previously attested to (Hantera, 2021).

All these findings together suggest that Saudi ophthalmologists still rely mainly on classic diagnostic methods and conservative management techniques, which, although practical and economical, might not completely mirror the intricate DED pathophysiology. Similarly, the limited adoption of advanced imaging modalities, including non-invasive tear break-up time (NIBUT) and meibography, points to the need for increased awareness as well as the provision of the latest diagnostic technologies.

In order to achieve better accuracy in diagnostics and treatment outcomes, future ventures should indeed be built around training programs that not only boost practitioners' comprehension of meibomian gland malfunction and evaporative dry eye but also support the creation of national clinical guidelines for DED diagnosis and management. Furthermore, the adoption of common diagnostics and evidence-based treatments will allow for a more accurate representation of the Saudi population's disease mechanisms in the participating healthcare facilities' diagnostic practices.

4. CONCLUSIONS

This research presents significant information about the treatment and diagnosis of dry eye disease (DED) among eyecare professionals in Saudi Arabia. Accessibility, simplicity, and cost-effectiveness were the main factors that led to the preferential use of the traditional diagnostic tools, specifically fluorescein tear break-up time (TBUT) and Schirmer tests. The environmental factors associated with the arid climate of the Kingdom and the lifestyle-related risk factors were reflected in the finding that meibomian gland dysfunction and environmental factors were the most common causes of DED.

The use of artificial tears is still the most important part of DED treatment, while the limited application of drug-delivery methods aimed at the glands and more advanced therapies points to the need for the continuous education of professionals, along with better access to newer diagnostic and treatment technologies.

It is recommended that future research be aimed at setting up the regionally adapted standardized diagnostic protocols, clinical outcome assessment of the various treatment methods, and the fostering of modern imaging and therapy integration for the betterment of dry eye care in Saudi Arabia.

Acknowledgments

The authors wish to express their sincere gratitude to the participants who took part in the study and generously contributed their time and insights. Appreciation is also extended to the professionals who assisted in distributing the questionnaire through their professional networks. This research was conducted without any external funding or institutional support.

REFERENCES

- Alharbi, S. S., Almutairi, G. M., Alkhodier, A. A., Alkhathemi, A., Almutairi, H. M., Almousa, W. A., Alabdulminaim, J. A., Alsadhan, G. A., Aldokhail, L. S., & Almaziad, D. O. (2024). Assessment of Awareness of Dry Eye in Youth and Its Association with Extended Screen Time Use in Saudi Arabia. *Open Access Macedonian Journal of Medical Sciences*, *12*(4), 542–548.
- Alkhaldi, S. A., Allam, K. H., Radwan, M. A., Sweeney, L. E., & Alshammeri, S. (2022). Estimates of dry eye disease in Saudi Arabia based on a short questionnaire of prevalence, symptoms, and risk factors: The Twaiq Mountain Eye Study I. *Contact Lens and Anterior Eye*, *46*(2), 101770.
- AlSomali, A. I., Alsaad, M. A., Alshammary, A. A., Al-Omair, A. M., Alqahtani, R. M., Almalki, A. S., Alhejji, A. E., & Alqahtani, W. Y. (2023). Awareness about dry eye symptoms and risk factors among the Eastern province population in Saudi Arabia. *Cureus*, *15*(11), e48197.
- Asiedu, K., Kyei, S., Ayobi, B., Agyemang, F. O., Ablordeppey, R. K., Asiedu, K., Kyei, S., Ayobi, B., Agyemang, F. O., & Ablordeppey, R. K. (2016). Survey of eye practitioners' preference of diagnostic tests and treatment modalities for dry eye in Ghana. *Contact Lens and Anterior Eye*, *39*(6), 411–415.
- Binyousef, F. H., Alruwaili, S. A., Altammami, A. F., Alharbi, A. A., Alrakaf, F. A., & Almazrou, A. A. (2021). Impact of dry eye disease on work productivity among Saudi workers in Saudi Arabia. *Clinical Ophthalmology*, *Volume 15*, 2675–2681.
- Graham, J. E., McGilligan, V. E., Berrar, D., Leccisotti, A., Moore, J. E., Bron, A. J., & Moore,

T. C. (2009). Attitudes towards Diagnostic Tests and Therapies for Dry Eye Disease. *Ophthalmic Research*, *43*(1), 11–17.

- Hantera, M. M. (2021). Trends in dry eye disease management worldwide. *DOAJ (DOAJ: Directory of Open Access Journals)*.
- Helayel, H., Abdulhadi, H. A., Aloqab, A., Althubaity, A., Aljumah, M., Mazhar, M., Habash, A. A., Aljindan, M., & Alarfaj, K. (2023). Prevalence and Risk Factors of Dry Eye Disease among Adults in Saudi Arabia. *Saudi Journal of Medicine and Medical Sciences*, *11*(3), 242–249.
- Lemp, M., & Benítez-Del-Castillo, J. (2013). Definition and classification of dry eye disease. In *Jaypee Brothers Medical Publishers (P) Ltd. eBooks* (p. 21).
- Sheppard, J., Lee, B. S., & Periman, L. M. (2022). Dry eye disease: identification and therapeutic strategies for primary care clinicians and clinical specialists. *Annals of Medicine*, *55*(1), 241–252.
- Stapleton, F., Alves, M., Bunya, V. Y., Jalbert, I., Lekhanont, K., Malet, F., Na, K., Schaumberg, D., Uchino, M., Vehof, J., Viso, E., Vitale, S., & Jones, L. (2017). TFOS DEWS II Epidemiology Report. *The Ocular Surface*, *15*(3), 334–365.
- Sheppard, J., Lee, B. S., & Periman, L. M. (2022). Dry eye disease: identification and therapeutic strategies for primary care clinicians and clinical specialists. *Annals of Medicine*, *55*(1), 241–252.
- Turner, A. W., Layton, C. J., & Bron, A. J. (2005). Survey of eye practitioners' attitudes towards diagnostic tests and therapies for dry eye disease. *Clinical and Experimental Ophthalmology*, *33*(4), 351–355.