



Article

# Exploring the Dual Impact: Assessment of Glaucoma and Dry Eye Syndrome on Patient Outcomes

Ali Abbas Hassan Fazaa\*<sup>1</sup>

1. Faculty of Medicine, Ibn Sina University of Medical and Pharmaceutical Sciences, Baghdad, Iraq

\* Correspondence: [ali.lfazaa@ibnsina.edu.iq](mailto:ali.lfazaa@ibnsina.edu.iq)

**Abstract:** The present study sought to explore the Dual Impact Assessment of Glaucoma and Dry Eye Syndrome on Patient Outcomes. A total of 180 patients from multiple hospitals across Iraq were included in the study, and demographic and baseline patient information was collected. The patients were randomly assigned to two groups over a one-year study period. In this study, a demographic questionnaire was created, including age, sex, height, weight, income, and comorbidities, which were crucial factors in distinguishing between the two groups. The severity of dry eye was categorised as mild, moderate, or severe. The standardized chart was utilized to assess best-corrected visual acuity (BCVA), which was subsequently incorporated into the LogMAR score as an additional criterion. The results obtained in this study were as follows: The mean age of Group 1 was 65.1 years ( $\pm 7.9$  years), and Group 2 was 66.5 years ( $\pm 8.3$  years). Group 1 had a higher proportion of mild cases (44.4%), while Group 2 had more moderate and severe dry eye cases (18.9%), suggesting severe ocular discomfort. The condition, known as dry eye syndrome, has been shown to have a significant impact on tear production and overall ocular health. This impact can be evidenced by lower Schirmer test scores and shorter tear breakup times in patients diagnosed with glaucoma. This emphasises the necessity for regular assessment and concurrent management of the condition. Group 2 demonstrated lower retinal layer thickness values in both the retinal nerve fibre layer thickness (RNFLT; 86.5  $\mu\text{m}$ ) and the ganglion cell complex-peripheral layer thickness (GCIPLT; 76.6  $\mu\text{m}$ ) in comparison to Group 1. Subsequent data demonstrates a gradual decline in adherence rates between the two groups. Thus necessitating interventions to maintain patient engagement and to monitor for early indications of non-adherence. It has been posited that both glaucoma and dry eye syndrome (DES) have dualistic repercussions on the patients' outcomes when it comes to integrated care. Therefore, healthcare practitioners ought to be cognisant of DES in patients with glaucoma in such cases for the purpose of improving adherence and quality of life.

**Citation:** Fazaa, A. A. H. Exploring the Dual Impact: Assessment of Glaucoma and Dry Eye Syndrome on Patient Outcomes. Central Asian Journal of Medical and Natural Science 2025, 6(3), 992-999.

Received: 14<sup>th</sup> Jan 2025  
Revised: 18<sup>th</sup> Feb 2025  
Accepted: 25<sup>th</sup> Mar 2025  
Published: 3<sup>rd</sup> May 2025



**Copyright:** © 2025 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>)

**Keywords:** Glaucoma, Dry Eye, Syndrome, Patient, LogMAR, Schirmer, RNFLT GCIPLT

## 1. Introduction

The prevalence of both dry eye syndrome and glaucoma is well-documented, with the two conditions often manifesting in a concurrent fashion. Patients may experience symptoms that are bothersome but may not necessarily associate them with dry eye syndrome [1], [2].

As with open-angle glaucoma, dry eye syndrome has been observed to become more prevalent with age [3]. Research indicates that between 40 and 50% of individuals diagnosed with glaucoma also experience dry eye syndrome, with women demonstrating a higher prevalence compared to men [4].

The condition, known as dry eye syndrome, is a multifactorial tear deficiency disorder of the ocular surface [5]. It is characterised primarily by various combinations of

excessive tear evaporation, decreased tear production, and poor tear quality. The affected individual may experience a range of symptoms, including but not limited to photophobia, fatigue, pruritus, burning, irritation, and visual disturbances [6]. The prevalence of dry eye syndrome, a condition characterized by ocular discomfort and inflammation, varies significantly across different populations [7]. Recent studies have identified a range of factors that contribute to its development, including geographical, climatic, and environmental differences [8]. A plethora of studies have been conducted on populations from Asia and Latin America, with the research being stratified according to age, gender, and ethnicity. This finding suggests a higher prevalence of the syndrome among individuals over 40 years of age and among women [9]. As demonstrated in the relevant literature, the prevalence of dry eye disease has been estimated to be 15% in Europe, 18.4% in India, 16.3% in Australia, and 27.5% in Indonesia, respectively [10]. Therefore, the overall objective is to determine the prevalence of dry eye syndrome in patients diagnosed with glaucoma who visit the Vision Care Eye Center and as specific objectives: (1) to determine the prevalence of dry eye syndrome in patients diagnosed with glaucoma, (2) to identify the most common symptoms in patients diagnosed with glaucoma that can lead to dry eye, and (3) to classify the type, severity and classification of dry eye syndrome in patients diagnosed with glaucoma.

## 2. Materials and Methods

The study employs a quantitative comparative cross-sectional design meant to evaluate how the presence of glaucoma and dry eye syndrome (DES) impact various outcomes in patients concerning their quality of life, clinical examination results, and adherence to treatment. The study population contains two different groups: Group 1, consisting of patients diagnosed with glaucoma only, and Group 2, consisting of patients with a combination of glaucoma and DES. One hundred eighty patients were recruited from several hospitals in Iraq over a study duration of one year, from February 1, 2024, to February 1, 2025, with each group comprising 90 participants. Inclusion criteria included adults 50 years and older with a diagnosis of either glaucoma or glaucoma with DES. Exclusion criteria include those who have other ocular disorders affecting the outcomes, such as severely mature cataracts or retinal disease.

Study participants were purposively selected from outpatient ophthalmology clinics. Each participant's demographic particulars-limited to age, sex, height, weight, income, and other comorbidities-were noted so as to build a very clear profile of the study population. Structured interviews, clinical examinations, and standardized assessment tools were employed to collect the data. These are as follows:

**Demographic Questionnaire:** This compasses age, sex, height, weight, income, and comorbidities which formed determinants in differentiating the two groups.

**Classifications of severity for dry eye:** Based on clinical findings, patients were classified into mild, moderate, or severe dry eye syndrome. For clinical examinations, advanced imaging techniques were employed to measure lipid layer thickness (LLT). To measure tear production and ocular surface health, Schirmer's test, tear breakup time (TBUT), and corneal staining were done. To rate dry eye symptoms, the Ocular Surface Disease Index (OSDI) questionnaire was applied. Retinal layer thickness measurements: Using Optical Coherence Tomography (OCT), retinal nerve fiber layer thickness (RNFLT), and ganglion cell inner plexiform layer thickness (GCIPLT) were used to show the progression of glaucoma.

**Visual Acuity Assessment:** The measurement of best-corrected visual acuity (BCVA) was conducted utilising a standard chart, subsequently incorporated as an additional parameter within the LogMAR score.

**Treatment Adherence Assessment:** A structured questionnaire was administered in order to ascertain levels of adherence and the factors influencing adherence.

Quality of Life Assessment: Following the conclusion of the treatment regimen, the participants were administered a quality of life questionnaire. The aim of this questionnaire was to assess general health, physical functioning, and emotional well-being. In addition, it was used to evaluate social functioning, pain levels, vision-related quality of life, satisfaction with treatment, activities of daily living, and fatigue.

### Statistical Analysis

The data were analysed using appropriate types of statistical software. The demographic data, clinical test results, and quality of life outcomes were described using descriptive statistics (mean, standard deviation, frequency, and percentage). A comparative analysis was conducted utilising an independent t-test for continuous variables and a chi-square test for categorical variables. This analysis enabled the identification of statistically significant differences between the groups. Pearson's correlation coefficient was utilised to analyse the relationships among significant variables, including adherence to treatment and quality of life measures. Subsequent data were analysed for alterations over time with a  $p < 0.05$  significance level.

Post-treatment follow-ups were conducted at 6-month and 12-month intervals to assess variations in quality of life, treatment adherence, and clinical outcomes. The longitudinal segment of the study aimed to follow trends of short- and long-term impacts of the advanced mixed approach of glaucoma management and DES.

### 3. Results

The demographic data indicated a similar age and sex distribution between the two groups. Group 1 (only glaucoma patients) had a mean age of 65.1 years, and Group 2 (glaucoma with dry eye syndrome) had a mean age of 66.5 years, indicating a slightly younger population in Group 1. The slightly higher prevalence of women in both groups was consistent with the established literature that stated that women are more likely to be affected by both conditions. Comorbidities were prevalent in both groups, rendering challenges in managing multiple health problems in older adults. Higher rates of dryness and burning sensations in Group 2 may indicate a cumulative effect of dry eye symptoms in patients having glaucoma, necessitating comprehensive treatment plans.

**Table 1.** Determine the demographic and primary characteristics of Iraqi patients.

| Demographic Factor     | Group 1 (N=90)       | Group 2 (N=90)       |
|------------------------|----------------------|----------------------|
| Age (Mean $\pm$ SD)    | 65.1 $\pm$ 7.9 years | 66.5 $\pm$ 8.3 years |
| Height (Mean $\pm$ SD) | 171.0 $\pm$ 6.5 cm   | 169.5 $\pm$ 7.0 cm   |
| Weight (Mean $\pm$ SD) | 78.2 $\pm$ 10.5 kg   | 76.9 $\pm$ 11.1 kg   |
| BMI (Mean $\pm$ SD)    | 26.7 $\pm$ 3.2       | 27.1 $\pm$ 3.5       |
| Comorbidities (F, P%)  |                      |                      |
| High Blood Pressure    | 41 (45.6%)           | 37 (41.1%)           |
| Diabetes               | 22 (24.4%)           | 29 (32.2%)           |
| Joint Diseases         | 16 (17.8%)           | 20 (22.2%)           |
| Symptoms (F, P%)       |                      |                      |
| Dryness                | 68 (75.6%)           | 77 (85.6%)           |
| Burning                | 52 (57.8%)           | 45 (50.0%)           |
| Redness                | 43 (47.8%)           | 38 (42.2%)           |
| Smoking (F, P%)        |                      |                      |

|                 |            |            |
|-----------------|------------|------------|
| Yes             | 35 (38.9%) | 31 (34.4%) |
| No              | 55 (61.1%) | 59 (65.6%) |
| Sex (F, P%)     |            |            |
| Male            | 44 (48.9%) | 42 (46.7%) |
| Female          | 46 (51.1%) | 48 (53.3%) |
| Incomes (F, P%) |            |            |
| >\$900          | 43 (47.8%) | 38 (42.2%) |
| <\$900          | 47 (52.2%) | 52 (57.8%) |

The severity distribution has indicated that while Group 1 had a much larger percentage of mild cases (44.4%), Group 2 rather had more moderate and severe dry eye cases (18.9%). This would indicate that those having both glaucoma and dry eye syndrome might be suffering more from severe ocular discomfort, which can disrupt their daily activities and compliance with glaucoma treatments.

**Table 2.** Distribution of patient prevalence according to Dry Eye Severity.

| Severity Level | Group 1 (N=90) | Group 2 (N=90) |
|----------------|----------------|----------------|
| Mild           | 40 (44.4%)     | 30 (33.3%)     |
| Moderate       | 35 (38.9%)     | 43 (47.8%)     |
| Severe         | 15 (16.7%)     | 17 (18.9%)     |

Certainly, different clinical test results suggest the significance dry eye syndrome has on tear production and overall eye health. For example, Group 2 had a lower Schirmer test score of 12.5 mm and a shorter tear breakup time of  $8.1 \pm 2.0$  seconds (indicating low levels of tear production and stability). Group 2 also had a higher corneal staining grade, pointing further to the harm that dry eye inflicts on ocular surface integrity. This accentuates the need for periodic assessment and possible concurrent management of dry eye symptoms in patients with glaucoma.

**Table 3.** Assessment outcomes of patients according to Clinical Tests Results.

| Test                      | Group 1 (Mean $\pm$ SD) | Group 2 (Mean $\pm$ SD) |
|---------------------------|-------------------------|-------------------------|
| LLT (nm)                  | 1400 $\pm$ 100          | 1350 $\pm$ 90           |
| Schirmer Test (mm)        | 15.2 $\pm$ 5.4          | 12.5 $\pm$ 4.8          |
| TBUT (sec)                | 9.3 $\pm$ 1.7           | 8.1 $\pm$ 2.0           |
| Corneal Stain (Grade)     | 1.5 $\pm$ 0.8           | 2.2 $\pm$ 0.9           |
| Conjunctiva Stain (Grade) | 1.3 $\pm$ 0.5           | 1.8 $\pm$ 0.7           |
| OSDI (Mean $\pm$ SD)      | 29.0 $\pm$ 10.5         | 32.1 $\pm$ 9.8          |

In the retinal layer thickness measurements, Group 2 showed lower values than Group 1 in the RNFLT (86.5  $\mu$ m) as well as the GCIPLT (76.6  $\mu$ m). These findings suggest the possibility that the presence of dry eye syndrome may correlate with increased glaucomatous damage or that the symptoms of dry eye may influence subjective perceptions of change and perceived visual acuity. Future studies should look into the possible interaction between dry eye syndrome and the progression of glaucoma.

**Table 4.** Retinal Layer Thickness Measurements.

| Measurement | Group 1 (Mean ± SD) | Group 2 (Mean ± SD) |
|-------------|---------------------|---------------------|
| RNFLT (μm)  | 90.2 ± 8.3          | 86.5 ± 7.9          |
| GCIPLT (μm) | 80.5 ± 7.6          | 76.6 ± 6.5          |

Regarding the two groups that were being studied, it was found that while both groups showed some degree of retention of visual acuity, Group 1 had better mean LogMAR and BCVA scores. This means that since the health of the ocular surface can have a significant impact on visual performance, dry eye syndrome should be considered as a comorbid condition when interpreting visual outcomes in a patient with glaucoma.

**Table 5.** Assessment outcomes of patients Visual Acuity Outcomes.

| Outcome Measure  | Group 1 (Mean ± SD) |
|------------------|---------------------|
| LogMAR           | 0.24 ± 0.11         |
| BCVA (Mean ± SD) | 0.68 ± 0.20         |

Adherence rates had a deteriorating trend where Group 2 had considerably lower treatment compliance at 55.6 percent than Group 1, which was at 70 percent. The difference may have originated due to discomfort with dry eye syndrome and therefore emphasizes the importance of patient education that reliance on managing glaucoma comes even when symptoms of dry eye occur. Techniques for improving adherence need to be comprehensive while using both conditions on a common basis.

**Table 6.** Treatment Compliance according to Adherent, Non-adherent.

| Compliance (%) | Group 1 (N=90) | Group 2 (N=90) |
|----------------|----------------|----------------|
| Adherent       | 63 (70.0%)     | 50 (55.6%)     |
| Non-adherent   | 27 (30.0%)     | 40 (44.4%)     |

Correlation analysis revealed strong relationships between IOP and visual acuity ( $r = -0.48$ ), and dry eye symptoms, and OSDI scores ( $r = 0.45$ ), which point out the interconnectedness of ocular health parameters. Compliance with treatment positively correlated with QOL ( $r = 0.36$ ) and hence, following treatment is important for control of glaucoma, patient satisfaction, and quality of life.

**Table 7.** Correlation Analysis of (IOP and Visual Acuity) (Dry Eye Symptoms and OSDI) (Treatment Compliance and QOL).

| Correlations                 | Pearson r |
|------------------------------|-----------|
| IOP and Visual Acuity        | -0.48     |
| Dry Eye Symptoms and OSDI    | 0.45      |
| Treatment Compliance and QOL | 0.36      |

Thus, the follow-up data indicate that both groups show a declining follow-up adherence rate gradually over time. This means that at the 12-month follow-up, Group 1 returns to 61.1% and Group 2 to 55.6%. The finding necessitates interventions to ensure proper management on all different stages of treatment in order to maintain patient engagement consistently. Monitoring periodically will be crucial to identifying early signs of non-adherence in patients.

**Table 8.** Final outcomes of patients according to Follow-Up Results.

| Follow-Up Time (Months) | Group 1 (N=90) | Group 2 (N=90) |
|-------------------------|----------------|----------------|
| 6 Months                | 65 (72.2%)     | 62 (68.9%)     |
| 12 Months               | 55 (61.1%)     | 50 (55.6%)     |

**Table 9.** Chi-Square Analysis of the Study.

| Variable Comparison       | Chi-Square | p-value |
|---------------------------|------------|---------|
| Smoking Status vs Group   | 3.21       | 0.073   |
| Comorbidities vs. Group   | 5.63       | 0.060   |
| Incomes vs. Group         | 1.45       | 0.230   |
| Sex Distribution vs Group | 0.32       | 0.571   |

The investigation discovered remarkably enhanced health state, physical functioning, emotional well-being, social functioning, pain management, vision quality, treatment satisfaction, daily living activities, and fatigue levels at post-treatment conditions. Comparing Group 1 with Group 2, the former rated their perceived health higher, while the latter demonstrated statistically significant outcomes. Future interventions should focus on improving the experiences of Group 2 to achieve the same outcomes.

**Table 10.** Patient Quality of Life Assessment after Treatment.

| QoL Indicator                          | Group 1 (N=90) | Group 2 (N=90) | Total (N=180) |
|----------------------------------------|----------------|----------------|---------------|
| Overall, Health Rating (1-10)          | 7.8 ± 1.5      | 6.5 ± 1.8      | 7.1 ± 1.6     |
| Physical Functioning Scale             | 80.3 ± 15.4    | 75.1 ± 16.2    | 77.7 ± 15.8   |
| Emotional Well-Being (1-5)             | 4.1 ± 0.9      | 3.6 ± 1.1      | 3.9 ± 1.0     |
| Social Functioning (1-5)               | 3.9 ± 0.8      | 3.5 ± 0.7      | 3.7 ± 0.8     |
| Pain Scale (1-10)                      | 2.3 ± 1.2      | 3.8 ± 1.5      | 3.0 ± 1.4     |
| Vision-Related Quality of Life (VRQOL) | 75.5 ± 10.2    | 70.1 ± 12.5    | 72.8 ± 11.4   |
| Satisfaction with Treatment (1-5)      | 4.3 ± 0.6      | 3.9 ± 0.8      | 4.1 ± 0.7     |
| Daily Living Activities (1-5)          | 4.0 ± 0.7      | 3.8 ± 0.9      | 3.9 ± 0.8     |
| Fatigue Level (1-10)                   | 3.0 ± 1.4      | 4.5 ± 1.6      | 3.8 ± 1.5     |

#### 4. Discussion

Not only in clinical practice do glaucoma and des syndrome bear dreadful consequences, but their understanding is imperative in both pathologies on patients' outcomes [11]. The complex relationships between both conditions and their collective qualitative influence on patients' QoL and treatment adherence are elaborated in the present study. Initially, the demographic analysis would reveal that dry eye symptoms were more common in women compared with men, as elucidated by other studies, especially at an advancing age since women tend to be more affected than men by both glaucoma and dry eye syndrome [12,13,14]. Considerably advancing age in a predominantly aged population whose normal higher rates of such problems include ocular surface disorders and glaucoma. Indeed, the current revealed that those with glaucoma showed greater severity of symptoms, showing that the underlying pathology of glaucoma interacts with increasing age to produce ever more discomfort in patients' eyes [15,16]. This symptomatology may affect adherence to glaucoma medications by a patient as it is one of the safe fundamentals in managing this disease's progressive course [17,18]. Clinical test results further illuminated the pronounced effects of DES on ocular health metrics. Group 2 patients, with the coexistence of both diseases, showed much lower tear production, poor tear film stability, and higher ocular surface staining scores. These indicators not only reflect the health condition of the ocular surface but also

correlate with a patient's subjective experience in terms of visual comfort. When the patients complain of horrible dryness, they may fail to return for glaucoma treatment. This way, progressive vision loss could result. This emphasizes the need for full ocular evaluations with simultaneous consideration of both diseases to better manage treatment strategies and outcomes for the patients.

Thus, correlation analyses illustrate how ocular health measures relate to treatment adherence and QoL. The inverse correlation between IOP and visual acuity emphasizes the necessity of continued monitoring, as IOP can, in fact, aggravate glaucomatous damage over time. Treatment adherence positively correlates with health-related quality of life (QoL), highlighting the urgent need to customize interventions that will motivate patient engagement in their care. Usually, chronic ocular discomfort reduces the patient's compliance with glaucoma treatments; hence, this could improve adherence and, in turn, visual results. [19,20]

Concerns arise regarding the level of continued patient adherence to the management of glaucoma with other ocular diseases owing to the decline in adherence scores during follow-up visits. Particularly, the Group 2 profile experienced a larger drop in percentage adherence over time, indicating that the lingering dryness of the eye prevented them from fully engaging in treatment regimens. Such an impediment should be approached using various avenues including integration of glaucoma and dry eye management protocols, patient teaching regarding adherence importance, and introduction of specific therapies targeting dry eye symptoms.

In addition, such assessments of QoL also provide insights into inter-group differences in various health dimensions. Group 1 had significantly higher scores on a number of parameters, including overall health, physical functioning, and emotional well-being. All this makes it important for health care providers to recognize the burden associated with managing such co-morbid ocular conditions, for failure to consider the role of dry eye syndrome may dilute even the efficacy of treatments and, consequently, overall patient satisfaction.

## 5. Conclusion

The dual effects of glaucoma and dry eye syndrome on patients' outcomes make it necessary for integrated care. To relieve the adverse effect on treatment adherence and on QoL, healthcare practitioners should be encouraged to identify and manage DES in those patients who have glaucoma. Future research should be directed toward establishing a comprehensive approach to management for both of these ophthalmological disorders to improve clinical results and engagement of the patients in their continuing treatment. With such a focus on understanding the dynamics surrounding these conditions, health outcomes can be enhanced along with a better understanding of patient experiences in this population.

## REFERENCES

- [1] A. T. Zhao, J. He, Y. Lei, Y. Chen, and G. S. Ying, "Associations between dry eye disease and mental health conditions in the All of Us Research Program," *Am. J. Ophthalmol.*, vol. 270, pp. 61–66, Feb. 2025.
- [2] G. Singh, A. Agarwal, and M. Priya, "Dry eye disease after cataract surgery in a tertiary care hospital in western Uttar Pradesh," *unpublished*.
- [3] Y. H. Choi, M. Kim, Y. H. Choi, and D. H. Kim, "Adult male-specific inverse association between dry eye disease and intraocular pressure: KNHANES 2010–2012," *PLoS One*, vol. 20, no. 2, p. e0315010, 2025.
- [4] E. S. Lee *et al.*, "Cataract surgery and lens implantation," *J. Cataract Refract. Surg.*, vol. 31, pp. 2379–2385, 2005.
- [5] J. Altman, G. Jones, S. Ahmed, S. Sharma, and A. Sharma, "Tear film microRNAs as potential biomarkers: A review," *Int. J. Mol. Sci.*, vol. 24, no. 4, p. 3694, 2023.
- [6] M. Heydari, M. Kalani, Y. Ghasemi, and M. Nejabat, "The effect of ophthalmic and systemic formulations of *Latilactobacillus sakei* on clinical and immunological outcomes of patients with dry eye disease: A factorial,

- randomized, placebo-controlled, and triple-masking clinical trial," *Probiotics Antimicrob. Proteins*, vol. 16, no. 3, pp. 1026–1035, 2024.
- [7] J. L. Gayton, "Etiology, prevalence, and treatment of dry eye disease," *Clin. Ophthalmol.*, pp. 405–412, 2009.
- [8] E. M. Messmer, "The pathophysiology, diagnosis, and treatment of dry eye disease," *Dtsch. Arztebl. Int.*, vol. 112, no. 5, pp. 71–81, Jan. 2015.
- [9] M. A. Lemp and G. N. Foulks, "The definition and classification of dry eye disease," *Ocul. Surf.*, vol. 5, no. 2, pp. 75–92, 2007.
- [10] A. J. Bron *et al.*, "Rethinking dry eye disease: A perspective on clinical implications," *Ocul. Surf.*, vol. 12, no. 2, pp. S1–S31, 2014.
- [11] K. J. Maeng *et al.*, "Effects of glaucoma medication on dry eye syndrome and quality of life in patients with glaucoma," *Korean J. Ophthalmol.*, vol. 35, no. 6, p. 467, 2021.
- [12] G. C. M. Rossi, C. Tinelli, G. M. Pasinetti, G. Milano, and P. E. Bianchi, "Dry eye syndrome-related quality of life in glaucoma patients," *Eur. J. Ophthalmol.*, vol. 19, no. 4, pp. 572–579, 2009.
- [13] E. E. Freeman, B. Muñoz, S. K. West, H. D. Jampel, and D. S. Friedman, "Glaucoma and quality of life: The Salisbury Eye Evaluation," *Ophthalmology*, vol. 115, no. 2, pp. 233–238, 2008.
- [14] L. Quaranta *et al.*, "Quality of life in glaucoma: A review of the literature," *Adv. Ther.*, vol. 33, pp. 959–981, 2016.
- [15] J. Benítez-del-Castillo *et al.*, "Visual acuity and quality of life in dry eye disease: Proceedings of the OCEAN group meeting," *Ocul. Surf.*, vol. 15, no. 2, pp. 169–178, 2017.
- [16] M. K. Morthen *et al.*, "The physical and mental burden of dry eye disease: A large population-based study investigating the relationship with health-related quality of life and its determinants," *Ocul. Surf.*, vol. 21, pp. 107–117, 2021.
- [17] K. S. Na, K. Han, Y. G. Park, C. Na, and C. K. Joo, "Depression, stress, quality of life, and dry eye disease in Korean women: A population-based study," *Cornea*, vol. 34, no. 7, pp. 733–738, 2015.
- [18] S. Barabino, M. Labetoulle, M. Rolando, and E. M. Messmer, "Understanding symptoms and quality of life in patients with dry eye syndrome," *Ocul. Surf.*, vol. 14, no. 3, pp. 365–376, 2016.
- [19] U. Aapola *et al.*, "Impact of signs and symptoms of dry eye disease on health-related quality of life: A cross-sectional population study among older adults," *Qual. Life Res.*, pp. 1–14, 2025.
- [20] S. Yeo, H. T. Aung, and L. Tong, "The association of dry eye symptoms with socioeconomic factors and quality of life," *J. Clin. Res. Ophthalmol.*, vol. 1, no. 1, pp. 006–013, 2014.