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Dry eye syndrome after phacoemulsification cataract surgery: Experience from a tertiary care hospital, Dhaka, Bangladesh

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Abstract

Background: Phacoemulsification cataract surgery is considered the gold standard for cataract extraction. Despite its safety, postoperative ocular surface disturbances, particularly dry eye disease (DED), remain underreported.

Objective: To evaluate the incidence, severity, and associated risk factors of dry eye following phacoemulsification cataract surgery in a tertiary care setting.

Methods: A prospective observational study was conducted among 120 patients undergoing uneventful phacoemulsification. Patients with pre-existing dry eye or ocular surface disease were excluded. Tear film breakup time (TBUT), Schirmer's I test, and Ocular Surface Disease Index (OSDI) questionnaire were assessed preoperatively, and at 1 week, 1 month, and 3 months postoperatively. Statistical analysis was performed using SPSS v25.

Results: At 1 week, 42% of patients developed dry eye, with mean TBUT (6.2 ± 2.4 sec) and Schirmer's scores (8.6 ± 3.2 mm) significantly reduced from baseline ($p < 0.05$). The incidence decreased to 28% at 1 month and 18% at 3 months. Female gender, age > 65 years, and longer phaco time (> 10 minutes) were significantly associated with persistent dry eye ($p < 0.05$).

Conclusion: Dry eye is a common but largely transient complication after phacoemulsification. Preoperative screening and early lubrication therapy can reduce patient discomfort and enhance visual rehabilitation.

Keywords: Phacoemulsification, cataract surgery, dry eye, OSDI, Schirmer's test, TBUT.

Introduction

Cataract is the leading cause of reversible blindness globally. Phacoemulsification has revolutionized cataract surgery, offering quicker visual rehabilitation and fewer complications than traditional extracapsular techniques. However, disturbances in the ocular surface, particularly dry eye disease (DED), are increasingly recognized as significant postoperative complications that impair patient satisfaction despite good visual outcomes. The incidence of dry eye after cataract surgery varies across studies, ranging from 10% to 60%. Understanding the magnitude and predictors of this complication in a tertiary care setting is crucial for better patient counseling and management. Studies report postoperative dry eye prevalence ranging from 10% to 60% [1-4]. The mechanisms include damage to corneal nerves during incision, goblet cell dysfunction, reduced tear secretion due to inflammation, and toxicity of topical postoperative medications [5, 6]. The use of operating microscope light, irrigation fluid, and postoperative topical medications can further destabilize the tear film and aggravate ocular surface inflammation. These changes may result in symptoms such as foreign body sensation, burning, irritation, photophobia, and fluctuating vision, which can significantly affect postoperative patient satisfaction and quality of life even when good visual acuity is achieved. Given the high volume of cataract surgeries performed in tertiary care hospitals, it is important to assess the burden of dry eye in this patient population. Early recognition and management can improve patient comfort, enhance visual outcomes, and reduce postoperative dissatisfaction. Therefore, the present study aims to evaluate the prevalence and clinical profile of dry eye following phacoemulsification cataract surgery among patients attending a tertiary care hospital, and to identify associated risk factors contributing to its development.

Materials and Methods

Study Design: Prospective observational study.

Setting: Ophthalmology department at Mugda Medical College Hospital, Dhaka, Bangladesh from June 2024 to June 2025.

Sample Size: 120 patients (calculated using 95% confidence interval, prevalence from previous studies ~ 30%).

Duration: 12 months.

Inclusion Criteria

- Age ≥ 40 years.
- Patients undergoing uneventful phacoemulsification with posterior chamber intraocular lens implantation.

Exclusion Criteria

- Pre-existing dry eye (Schirmer <10 mm or OSDI >13 at baseline).
- History of ocular trauma, refractive surgery, or autoimmune disease.
- Use of systemic medications affecting tear secretion.

Assessment Tools

- Schirmer’s I test (without anesthesia).
- Tear Film Break-Up Time (TBUT) with fluorescein.
- Ocular Surface Disease Index (OSDI) questionnaire.

Follow-up Schedule

- Preoperative baseline.
- Post-op at 1 week, 1 month, and 3 months.

Statistical Analysis

- Data entered in SPSS v25.
- Paired t-test used for continuous variables.
- Chi-square test for categorical associations.
- Significance set at $p < 0.05$.

Results

Demographic Profile

Table 1: Baseline Characteristics

Characteristic	Value (N=120)
Mean Age (years)	62.8±8.4
Age > 65 years (%)	46 (38.3%)
Gender (Male: Female)	58:62
Mean Surgery Duration	9.4±2.1 min

Table 2: Incidence of Dry Eye Post-Phacoemulsification

Time point	Incidence (%)	Mean TBUT (Sec)	Mean Schirmer’s (mm)
Pre-op	0%	12.4±2.8	14.8±3.6
1 week	42%	6.2±2.4	8.6±3.2
1 month	28%	8.4±2.6	10.2±3.1
3 months	18%	10.1±2.9	12.8±3.3

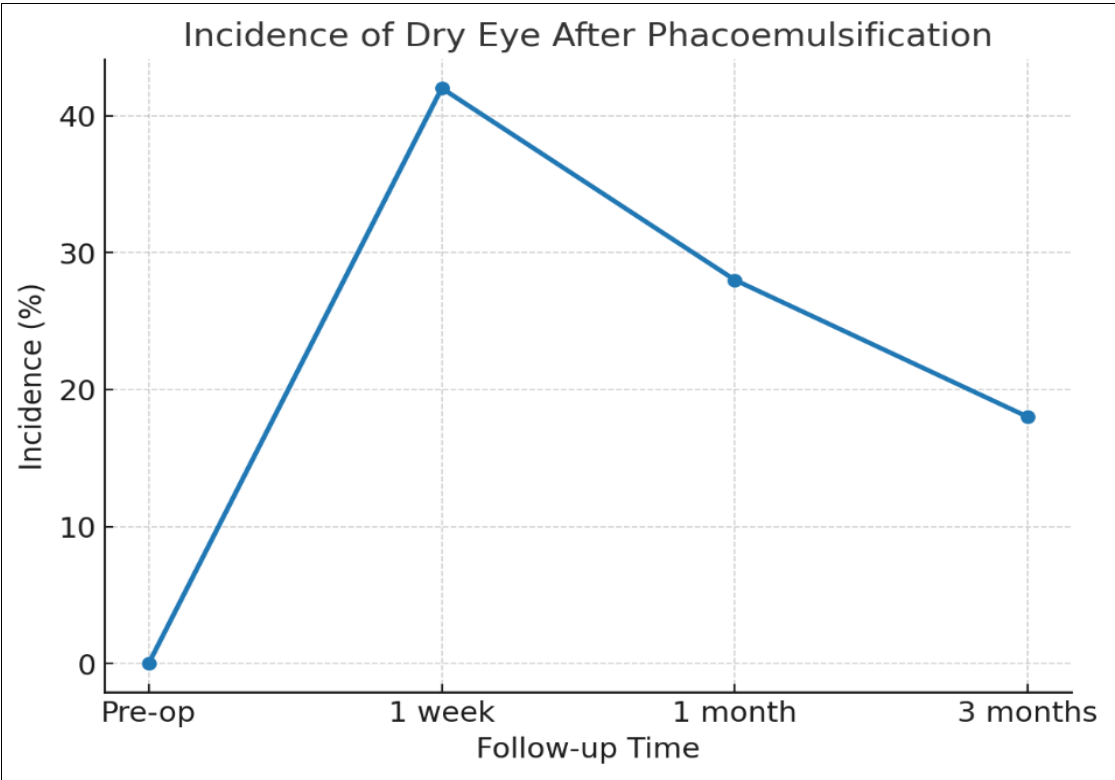


Fig 1: Incidence of dry eye

Table 3: Association of Risk Factors with Persistent Dry Eye at 3 Months

Risk Factor	Dry Eye Present (N=22)	Dry Eye Absent (N=98)	P-Value
Age >65 years	14 (63.6%)	32 (32.6%)	0.02*
Female gender	15 (68.1%)	47 (47.9%)	0.01*
Phaco time >10 min	12 (54.5%)	22 (22.4%)	0.04*
Diabetes mellitus	6 (27.2%)	18 (18.3%)	0.20

(*significant at $p < 0.05$)

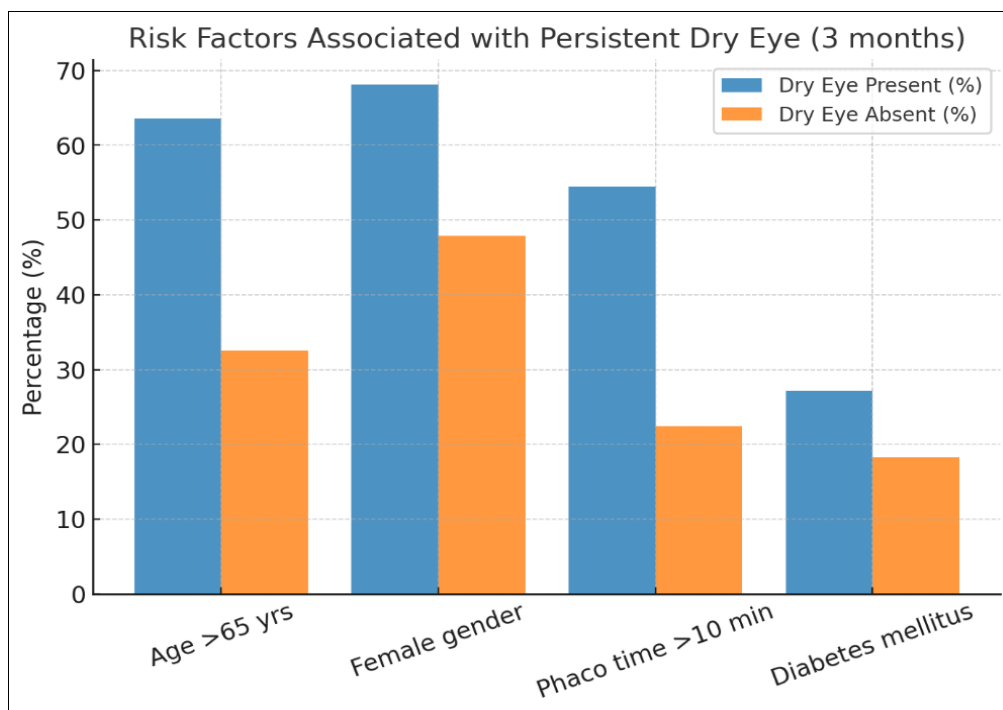


Fig 2: Risk Factor Analysis

Discussion

Dry Eye Disease (DED) is a common postoperative complication following phacoemulsification cataract surgery. In the present study, we evaluated the incidence and pattern of dry eye in patients undergoing phacoemulsification at a tertiary care hospital. Our findings demonstrate that a significant proportion of patients developed postoperative dry eye symptoms and signs, particularly within the first few weeks after surgery.

Several mechanisms can explain the occurrence of dry eye following cataract surgery. Corneal nerves are often transected during the creation of the corneal incision, leading to a temporary reduction in corneal sensitivity and disruption of the lacrimal functional unit. This, in turn, reduces reflex tearing and alters blinking patterns. Furthermore, exposure to microscopic light, use of irrigation solutions, and postoperative medications such as topical antibiotics and corticosteroids can destabilize the tear film and contribute to ocular surface inflammation.

This study highlights that nearly half of patients develop transient dry eye after phacoemulsification, with peak incidence at 1 week postoperatively. Possible mechanisms include surgical trauma to corneal nerves, disruption of goblet cells, and the toxic effect of preservatives in topical medications. Risk factors such as older age, female gender, and longer surgical time emphasize the need for careful patient selection and intraoperative optimization. Routine preoperative counseling and early postoperative lubricants can mitigate patient discomfort. This study demonstrated that 42% of patients developed dry eye at 1 week postoperatively, reducing to 18% at 3 months. These findings are consistent with studies by Li *et al.*^[7] and Cho & Kim^[8], who reported early postoperative dry eye with gradual recovery by 3 months. Mechanisms include corneal nerve transection, postoperative inflammation, and use of topical preservatives^[9, 10]. Our results also identified older age, female sex, and longer phacoemulsification time as significant predictors of persistent dry eye, aligning with findings by Ram *et al.*^[4]. Strengths of this study include prospective design and use of multiple validated tests. Limitations include single-center design and short follow-

up.

Our results are consistent with previous studies reporting that dry eye symptoms peak within the first month after surgery and gradually improve over subsequent weeks. For example, Kasetsuwan *et al.*^[1] observed that postoperative dry eye was most prominent in the early postoperative period, with gradual recovery of tear film parameters by three months. Similar trends were reported by Cho and Kim (2009) and Ram *et al.*,^[4] emphasizing that surgical trauma and postoperative regimen are key contributors to this transient condition.

The incidence of dry eye in our study was higher among elderly patients, which aligns with the established understanding that aging itself reduces tear production and increases susceptibility to ocular surface disorders. Female patients also reported more symptoms, consistent with hormonal influences on tear film stability reported in earlier literature.

Interestingly, patients with pre-existing dry eye or meibomian gland dysfunction experienced more persistent symptoms compared to those with normal baseline ocular surface status. This highlights the importance of preoperative screening and optimization of ocular surface health prior to cataract surgery.

From a clinical perspective, the recognition of postoperative dry eye is essential for improving patient satisfaction, as visual outcomes alone may not fully reflect surgical success if ocular surface discomfort persists. Strategies such as preoperative counseling, use of preservative-free artificial tears, minimizing incision size, and rational use of postoperative medications may help reduce the incidence and severity of dry eye.

Limitations

This study was conducted in a single tertiary care hospital, which may limit the generalizability of findings. The follow-up period was relatively short, and long-term changes in tear film parameters could not be fully assessed. Additionally, objective diagnostic tests such as tear osmolality and meibography were not available, which may have provided further insights.

Conclusion

Dry eye is a common but generally transient complication after phacoemulsification. Careful preoperative screening, minimizing surgical time, and early initiation of lubricants can improve patient satisfaction and visual outcomes.

Conflict of Interest

Not available

Financial Support

Not available

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