



**COMPARITIVE STUDY OF POST-PHACOEMULSIFICATION TEAR FILM STABILITY  
AND TEAR SECRETION IN DIABETIC AND NON-DIABETIC PATIENTS**

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### ABSTRACT

**Introduction:** Cataract is the leading cause of blindness in the world. Phacoemulsification is increasingly applied in the management of cataract. Diabetic patients are at a higher risks to develop cataract at an earlier age than the non-diabetic patients. Various researches have shown that patient with type2 diabetes mellitus are more likely to have tear film stability abnormalities. **Methods and Materials:** A total of 100 eyes of patients undergoing cataract extraction by phacoemulsification in Ophthalmology department were selected. 50 eye were of diabetic patients and 50 eye were of non-diabetic patients. A detailed study of tear film secretion and tear film stability was assessed pre-operatively and 7<sup>th</sup> day post operatively of each eye. **Conclusion:** Dry eye symptoms developed immediately after phacoemulsification and the severity peaked on day. Diabetic patients undergoing cataract surgery by phacoemulsification are prone to dry eye disease, ocular symptoms, tear film stability are transiently worsened in diabetic patients than the non-diabetic patients. Tear secretion is reduced in the diabetic patients which worsen dry eye symptoms and pre-disposes these patients to ocular damage.

### INTRODUCTION

Cataract is the leading cause of blindness in the world. Phacoemulsification is increasingly applied in the management of cataract.<sup>[1]</sup> Diabetes mellitus, commonly termed as diabetes, is a group of metabolic diseases with high blood sugar levels.<sup>[2]</sup> Diabetic patients are at a higher risks to develop cataract at an earlier age than the non-diabetic patients. It has been estimated that up to 20% of all cataract surgeries are performed on diabetic patients (Hamilton et al., 1996).<sup>[3]</sup>

Diabetes can cause severe vision loss or even blindness, due to ophthalmic complications such as diabetic retinopathy and cataract.<sup>[4,5]</sup> In addition, diabetes is associated with abnormal tear quantity and quality and goblet cell loss, which play important roles in the balance of tear film function.<sup>[6-8]</sup>

Postoperative complaints include ocular symptoms of dryness, irritation, foreign body sensation, pain, burning, redness and fatigue.<sup>[9,10]</sup> The application of topical medications, intraoperative exposure to the microscopic light, impaired corneal sensitivity, increased tear osmolarity, conjunctival goblet cell loss and surgery-related inflammation are thought to contribute to postoperative dry eye syndrome.<sup>[11]</sup>

### AIMS

Comparitive study of post-phacoemulsification tear film stability and tear secretion in diabetic and non-diabetic patients.

### OBJECTIVES

1. To compare tear film stability post-phacoemulsification in diabetics and non diabetics.
2. To compare tear secretion post-phacoemulsification in diabetics and non diabetics

### METHODS AND MATERIALS

#### Study design

It is a rural hospital based, case-control study.

Duration: 1 year

#### Material and methods

A total of 100 eyes of patients undergoing cataract extraction by phacoemulsification in Ophthalmology department were selected. 50 eye were of diabetic patients and 50 eye were of non-diabetic patients.

#### Inclusion criteria

1. Patients undergoing phacoemulsification cataract surgery without preoperative dry eye, Age 30-80 years, Uneventful cataract extraction.

**Exclusion criteria:** Previous history of dry eye, Patients on drugs causing dry eye within 30 days before surgery, beta blockers, anti histamines, decongestants,

antidepressants etc., Autoimmune diseases, Pre-existing ocular diseases other than cataract, any other systemic diseases which can lead to dry eye, Previous ocular surgeries, Ocular trauma, Ocular allergies, Contact lens wearers, Smokers.

After enrollment of the subject to the study all subjects had undergone a thorough ophthalmic examination including

- Clinical history, Visual acuity on Snellen's chart, Slit lamp examination for anterior segment and slit lamp biomicroscopy for posterior segment evaluation was done.
- Patients then underwent clear corneal phacoemulsification cataract surgery with supero-temporal incision by a single experienced surgeon.
- Post-operatively, patients received Homatropine 2% eye drops twice daily for 15 days and eye drops (Moxifloxacin 0.3% +Dexamethasone 0.1%) 4 times per day which was then tapered over a duration of 1 month.
- TBUT, ST-I and OSDI Scoring was done pre-operatively as well as on 7th day post-operatively, 30<sup>th</sup> day post-operatively. Tear break-up time (TBUT) was used to calculate the incidence of dry eye.<sup>[12]</sup> Dry eye severity pattern after phacoemulsification was obtained from the average of Schirmer I test, tear break-up time (TBUT), OSDI scores,
- The questionnaire was modified by omitting question no. 4 & 5, which assesses the evidence of poor and blurred vision, as the symptoms may be caused due to cataract alone or combined with symptoms that are induced by dry eye hence, it was difficult to differentiate it.
- Analysis of results was done using SPSS software.

## OBSERVATIONS AND RESULTS

**Table No. 1: Demographic distribution of patients in the study.**

	Non diabetics	Diabetics
Mean age	64.64±4.44	65.0±6.84
Gender ratio (M:F)	1:1.18	1:1.26

**Table No. 2: table showing values of TBUT pre-operatively and post-operatively in diabetics and non-diabetics.**

	TBUT values (seconds)	
	Non-diabetic	Diabetic
Pre-operative day	13.1±1.4	10.1±1.2
Post-op day 7	8.3±2.7	7.6±2.1
Post-op day 30	10.5±1.6	8.4±1.4

**Table No. 3: table showing values of ST-I pre-operatively and post-operatively in diabetics and non-diabetics.**

	ST-I values (mm)	
	Non-diabetic	Diabetic
Pre-operative day	17.6±5.5	13.5±4.3
Post-op day 7	10.8±3.4	7.8±3.9
Post-op day 30	11.9± 6.1	11.0±3.6

**Table no. 4 table showing values of OSDI Scores pre-operatively and post-operatively in diabetics and non-diabetics.**

	OSDI Score	
	Non-diabetic	Diabetic
Pre-operative day	9.3±4.3	11.2±3.4
Post-op day 7	24.3±8.4	25.5±9.6
Post-op day 30	17.4±6.3	17.1±11.2

## DISCUSSION

In the present study it was found that dry eye can develop after phacoemulsification in diabetics as well as non-diabetic patients. It was also found that the pre-operative as well as post-operative values were significantly different in both the groups in all the tests i.e. in the pre-operative period, although all the patients had normal values of TBUT, ST-I and OSDI Scores, diabetic patients had values lower than the non-diabetic patients.

In the present study we calculated the TBUT, ST-I and OSDI score of the patients undergoing cataract extraction surgery by phacoemulsification in diabetics and non-diabetic patients. The values of all the three tests in pre-operative as well as a post-operative period were congruous to the studies done by Xi Liu<sup>[3]</sup> et al in the year 2008, D Jiang<sup>[13]</sup> et al in the year 2015 and M Yusufu<sup>[11]</sup> in the year 2017.

The study by Xi Liu et al stated that both diabetes mellitus and phacoemulsification may have effects on tear production and that a combination of the disease and the procedure may contribute to the increased dry eye symptoms. Tear production was even weakened after the surgery, when basal tear secretion in diabetic patients already diminished relatively to that of controls. Due to the lack of tearing, the cornea of diabetic patients is more prone to damage, and patients suffer more dry eye.<sup>[3]</sup>

Dogru et al.(2001) reported previously that TBUT and ST-I scores significantly decreased in non-insulin-dependent diabetes mellitus and suggested that diabetic neuropathy affected the innervation of the lacrimal gland and hypothesized that the reduction in goblet cell numbers may account for the shortening of TBUT and instability of the tear film as a result of decreased mucin production.<sup>[3]</sup>

## CONCLUSION

Phacoemulsification can lead to dry eye immediately after the surgery and severity levels can peak on day 7 which can gradually improve over time. It affects both the diabetic patients as well as the non-diabetic patients. Although the tear film stability and tear secretion are worse in the diabetic patients and the recovery is delayed. This difference may be due to the denervation caused by diabetic neuropathy as well as the clear corneal incision given during the phacoemulsification surgery in the patients which further pre-disposes the diabetic patients to ocular damage.

**Limitations**

- Small sample size.
- Short follow up period

in diabetic patients. *PloS one.* 2016 Jan 15; 11(1): e0146752.

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