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## Original Research Article

## A study of incidence of dry eye after manual small incision cataract surgery and phacoemulsification

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## ABSTRACT

**Aim:** To compare incidence of dry eye between phacoemulsification and manual small incision cataract surgery.**Materials and Methods:** This observational study included two groups. Group A consisted of 30 patients who had undergone manual small incision cataract surgery and Group B consisted of 30 patients who had undergone phacoemulsification. A detailed history was taken from all participants before they underwent a complete systemic and ocular examination which included best corrected visual acuity, slit lamp examination, intraocular pressure, and dilated fundus examination. Tests for dry eyes like Schirmer's test 1, tear film break up time (TBUT), tear meniscus height (TMH) was done postoperatively at 1 week, 3 weeks and 1 month postoperative. One test positive out of three was considered as a dry eye.**Results:** The values of various tear film tests schirmer's test, tear film break up time and tear meniscus height showed no significant difference between both groups (Chi square test P Value = 0.605, 0.832, 1). There was no significant difference in incidence of dry eye in manual small incision cataract surgery and phacoemulsification (Chi square test p value = 0.317). On comparing the data with respect to age and sex, no significant difference in incidence of dry eye was seen between both groups or between male and female. There is high incidence of dry eye 33.33 seen in diabetic patients. (Chi square test P Value = 0.0371).**Conclusion:** There is no significant difference in incidence of dry eye between manual small incision cataract surgery and phacoemulsification. We also found out high incidence of dry eye in diabetic patients.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: [reprint@ipinnovative.com](mailto:reprint@ipinnovative.com)

## 1. Introduction

According to the definition of the Dry Eye Workshop Study Group in 2007.<sup>1</sup> Dry eye is 'A multifactorial disease of the tear and ocular surface that results in symptoms of discomfort, visual disturbance and tear film instability with potential damage to ocular surface. It is accompanied by increased osmolarity of tear film and inflammation of the ocular surface.'

Estimate of dry eye disease prevalence ranging from 11.59% worldwide with standard deviation (SD = 0.04) and has become one of the leading cause of visit to

an ophthalmologist. Other epidemiological studies shows prevalence of 5-16% in America and Australia and 27-30% in Asia.<sup>2</sup>

Cornea, conjunctiva, lacrimal glands, meibomian glands and lids make up the ocular surface unit. They are connected with each other by sensory and motor nerves. Function of this unit is tear film maintenance. Dry eyes occur when there is a dysfunction of this unit. This leads to instability of tear film and breakup of the film before the next blink. The symptoms of which range from transient mild irritation to persistent dryness, itching, burning, redness, pain, ocular fatigue and visual disturbance.<sup>3</sup> Severe dry eye results in impairment in daily living, work productivity and may even

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affect mood.

Cataract surgery is one of the risk factors for dry eyes. Many factors are responsible for development of dry eye after cataract surgeries including decreased mucin production from the conjunctiva secondary to incision placement, decrease in tear film break-up time due to surface irregularity at the site of incision, prolonged use of steroid antibiotic eye drops, reduced corneal sensation due to surgical incision which disrupts the cornea-lacrimal gland lobe leading to reduce tear secretion, poor tear film production and instability due to surgically induced ocular inflammation and exposure to light from operating microscope.<sup>4</sup>

So this study was conducted to identify the incidence of dry eye after manual small incision cataract surgery and phacoemulsification.

## 2. Materials and Methods

The objectives of the present study were to compare the incidence of dry eye between phacoemulsification and manual small incision cataract surgery. This study was conducted in the Department of Ophthalmology, Govt. medical college and Sir Takhtsinhji hospital Bhavnagar. Data collected and analyzed for randomly selected 30 patients who had undergone manual small incision cataract surgery (Group A) and 30 patients who had undergone phacoemulsification (Group B) between 40 to 70 years age, and after taking written and informed consent of the patient. Patients having preexisting dry eye disease, disorder of lids and nasolacrimal pathway, previous history of ocular surgeries, allergy to fluorescein dye, taking drugs like antidepressants, antihistamines, retinoid, beta blockers, diuretics, oral contraceptives, chemotherapy were excluded from the study. Detailed history was taken including chief complaints, past history, family history, personal history, drug history followed by general and systemic examination and monitoring of vitals. Patients were examined by torch light and slit lamp for any abnormalities of eyebrows, eyelids, conjunctiva, cornea, sclera, iris, pupil and lens. All patients underwent Visual assessment using Snellen's visual acuity chart, examination of anterior segment in detail using slit lamp, slit-lamp biomicroscopy, refraction, intraocular pressure measurement using non-contact tonometer, fundus examination with direct/indirect ophthalmoscope. Schirmer's test 1, tear film break up time (TBUT), tear meniscus height. (TMH) done postoperatively at 1 week, 3 weeks and 1 month. Any one test positive out of three was considered as dry eye.

## 3. Results

This study was carried out in our ophthalmology department in government medical college, Bhavnagar on 60 patients divided into two groups. Group A consisted of 30

patients who had undergone manual small incision cataract surgery and Group B consisted of 30 patients who had undergone phacoemulsification surgery in the Department of Ophthalmology in Sir Takhtsinhji Hospital Bhavnagar. Data was analyzed by chi square test with Yates correction using SPSS software. The study was undertaken in age group of 40 to 70 years. Most of the patients were in 51-60 age group (50%) followed by 41-50 age group (32%) and 61-70 age group (18.33%).

### 3.1. Schirmer's test

Schirmer's test values at 1 week and 3 week shows P value of 0.605 and 0.472 with no significant difference in incidence of dry eye between two groups. At 1 month none of the patients in either group had dry eye.

### 3.2. Tear film break up time

Tear film break up time values at 1 week and 3 week shows P value of 0.832 and 0.605 with no significant difference in incidence of dry eye between two groups. At 1 month only two patients in group A had dry eye.

### 3.3. Tear meniscus height

Tear meniscus height value at 1 week shows P value of 1 with no significant difference in incidence of dry eye between two groups. At 3 week and 1 month no dry eye seen in both groups. So there is no significant difference in incidence of dry eye seen between both groups.

On correlating the data with systemic illness, 20% patients were diabetic and 18.33% patients were hypertensive higher incidence of dry eye in diabetic patients ( $p = 0.037$ ) and if we look at the percentage at 1 week 33.33% patients had dry eye which remains same at 3 weeks and 16.7% patients had dry even at 1 month with all 3 test for dry eyes. Which suggest that in diabetic patients dry eye remains for longer duration after cataract surgery. Whereas in hypertension 8.33% had dry eye at 1 week and no dry eye seen at 3 weeks and 1 month.

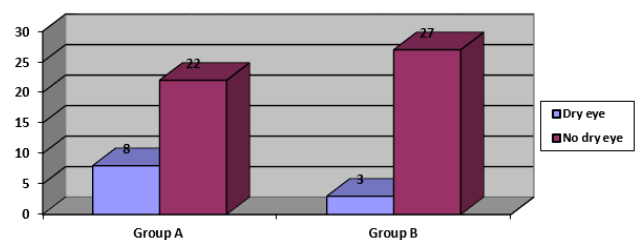


Fig. 1: Dry eye at 1 week group A versus B

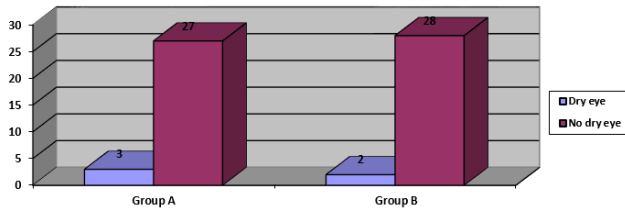


Fig. 2: Dry eye at 3 weeks group A versus B

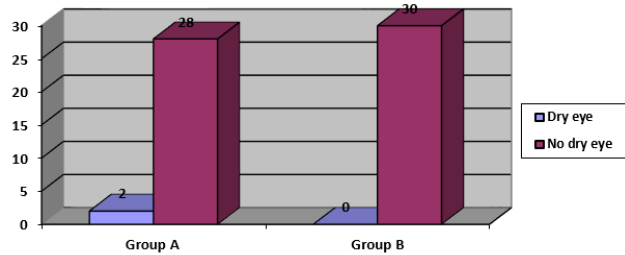


Fig. 3: Dry eye at 1 month group A versus B

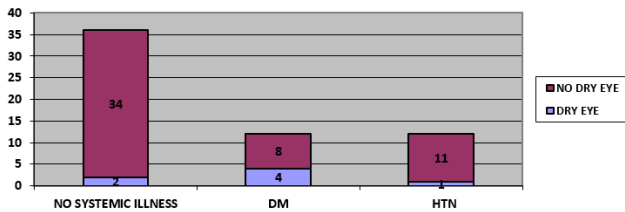


Fig. 4: Systemic illness versus dry eye at 1 week

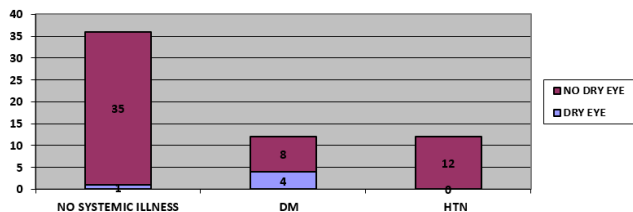


Fig. 5: Systemic illness versus dry eye at 3 weeks

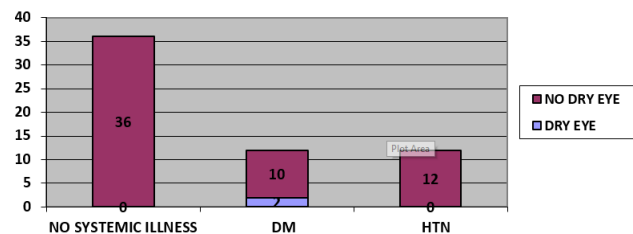


Fig. 6: Systemic illness versus dry eye at 1 month

#### 4. Discussion

A cataract surgery is the most common ophthalmic surgical procedure in the world. However, like any other surgery, it is not free from post-operative complications. With major innovation and recent advances there is increased patient’s expectation after cataract surgery. It is also necessary that patient has a healthy ocular surface postoperatively.

In our study we compared the incidence of dry eye after manual small incision cataract surgery and phacoemulsification. Mean age of patients in our study was 54.83. Maximum patients were in the age group 51-60 years (50%) followed by 41-50 years (32 %) followed by 61-70 year (18.33%). There was no significant difference in incidence of dry eye in different age groups. (P value = 0.226). In our study there were more females (56%) than males (43%) and no statistical significant difference in incidence of dry eye seen (p value = 0.875).

Saba Ishrat et al<sup>5</sup> reported no significant difference between male and female but some other studies reported female preponderance of this condition.

In our study we have used three tests for assessment of dry eye following each of phacoemulsification and MSICS. Schirmer’s test 1 value showed no statistical significant difference in both group at 1week (p value =0.605), 3week (p value = 0.472) and 1 month no dry eye seen in both groups. Saba Ishrat et al<sup>5</sup> have done study of incidence and pattern of dry eye after cataract surgery also reported no significant difference in schirmer’s test 1 in both groups. (p value = 0.241). Puspa Kumari et al<sup>6</sup> showed no statistically significant reduced value of schirmer’s test in both groups at 1 week, 4 weeks and 3 months.

In this study Tear film break up time showed no statistically significant difference in both the group at 1 week (P Value =0.832), 3 weeks (P Value = 0.605), at 1 month in group A only 2 patients had dry eye. Saba Ishrat et al<sup>5</sup> reported statistically significant reduced tear film break up time at 1 week, 1 month and 3 months after manual small incision cataract surgery. (p value = 0.034). Puspa Kumari et al<sup>6</sup> did not report any significant changes in tear film break up time following each procedure whether at 1 week or after 3 months.

In this study, tear meniscus height showed no statistically significant difference in both groups at 1 week (P value =1), at 3 weeks 1 patient in Group A had dry eye and no dry eye was noted in both groups at 1 month. Puspa Kumari et al<sup>6</sup> this study did not report any significant changes in tear meniscus height (p value = 0.8) following each procedure whether at 1 week or after 3 months.

This study showed no significant difference in incidence of dry eye following MSICS and phacoemulsification at 1 week (p value = 0.371), 3 weeks (p value = 1) and 1 month. Puspa Kumari et al<sup>6</sup> reported no significant difference in incidence of dry eye between two groups by Schirmer’s test and TBUT (p value = 0.9).

On correlating the data with systemic illness, no significant difference in incidence of dry eye was seen in hypertensive patients. Only after week, 8.33% patients had dry eye which is statistically insignificant and no dry eye seen at 3 weeks and 1 month. Association of dry eye with sex or systemic hypertension has been reported.<sup>7</sup> In our study on correlating data with systemic illness show higher incidence of dry eye in diabetic patients ( $p < 0.05$ ) and if we look at the percentage at 1 week 33.33% patients had dry eye which remained the same at 3 weeks and 16.7% patients had dry even at 1 month which suggests that in diabetic patients dry eye remains for longer duration after cataract surgery. Xi Liu et al<sup>8</sup> reported significantly increased Schirmer's test values on day 1 postoperative in both groups, and gradually returned to preoperative value in nondiabetic patients by day 90 of postoperative period. But values continued to reduce to 86% in diabetic patients.

The percentage of TBUT recovery in diabetic patients (93%) at 180 day was similar to that of the nondiabetic controls. This indicates that phacoemulsification has a greater effect on tear production in diabetics than in nondiabetics. Syed Ali Nasar Waris et al<sup>9</sup> carried out study of prevalence of dry eyes in diabetic patients. He found out that 43% diabetic patient had dry eye and there was significant association that was found in dry eye with poor glycaemic control and with longer duration of diabetes. So good glycaemic control is essential to reduce the prevalence of dry eye. Examination of dry eye should be considered as an integral part in the assessment of diabetic eye disease.

As compared to our study, other studies have not done dry eye test preoperatively and all test for dry eye was done postoperatively. But in our study, we performed test for dry eye preoperatively and patients who were not having dry eye preoperatively were included in the study.

In our study few patients had normal schirmer's test and tear meniscus height but abnormal tear film break up time which suggest that cataract surgery can have some adverse effect on mucous layer resulting in tear film instability and it also suggest that schirmer's test, tear film break up time and tear meniscus height should be done routinely after cataract surgery.

All ophthalmic surgeons must be aware of the fact that cataract surgery can induce transient dryness of ocular surface particularly in diabetic patients. Severe dry eye in diabetics may leads to visual impairment, corneal scarring, ulcers, leading to secondary bacterial infections. The synergistic effect of corneal infection and diabetes accelerates corneal lesions, which irreversibly change the ocular surface and induce visual impairment. So it is necessary for all diabetic patient to undergo screening for dry eye prior to cataract surgery and all diabetic patients may be advised lifestyle modifications like avoid long exposure to computers, Television and reading, humidification of air in the home and work place, avoid hot windy environment to prevent dry eye

postoperatively. The early diagnosis and treatment of dry eye are essential to avoid complications. Patients also advised lifestyle modification for good glycaemic control to prevent dry eye. The current treatment regimen for diabetic and nondiabetic dry eye patients are essentially the same. Lubricating eye drops and ointment still remains the first choice for treatment as they provide symptomatic relief. The most widely used anti-inflammatory drugs are corticosteroids, nonsteroidal anti-inflammatory drugs, cyclosporine A, tacrolimus, autologous blood serum, and several new drugs which are undergoing clinical trials. In patients with diabetes, corneal epithelial defects or side effects correlated with the topical drugs are more common than in those patients without diabetes mellitus. Newer studies recommend the use of topical insulin for treatment of diabetes associated dry eye. Topical insulin helps acinar cells proliferation and speeds the repair and healing of the lacrimal gland by stimulation of insulin like growth factor-1 receptor. Frequent routine follow-up for dry eye associated with diabetes mellitus is necessary during treatment.

## 5. Conclusion

Our study shows that there is no significant difference in incidence of dry eye between manual small incision cataract surgery and phacoemulsification. So manual small incision cataract surgery and phacoemulsification both are effective procedure with no difference regarding post-operative tear film stability and tear secretion. We found a higher incidence of dry eye in patients having diabetes mellitus. Schirmer's test, tear film break up time and tear meniscus height should be routinely done for diabetic patients both preoperatively and postoperatively.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

## References

1. Bron AJ, Abelson MB, Ousler G, Pearce E, Tomlinson A, Yokoi N, et al. Methodologies to diagnose and monitor dry eye disease: report of the Methodology Subcommittee of the International Dry Eye Workshop. *Ocul Surf.* 2007;5(2):108–52.
2. Craig JP, Nichols KK, Akpek EK, Caffery B, Dua HS, Joo CK, et al. TFOS DEWS II definition and classification report. *Ocul Surf.* 2017;15(3):276–83.
3. Dorennavar L, Maurya RP, Singh VP, Singh MK, Sharma K, Sharma R. The role of Rebampipde ophthalmic suspension in management of dry eye disease. *Ind J Clin Exp Ophthalmol.* 2015;1(4):191–6.
4. Chia EM, Mitchell P, Rochtchina E, Lee AJ, Maroun R, Wang JJ. Prevalence and associations of dry eye syndrome in an older population: the Blue Mountains Eye Study. *Clin Exp Ophthalmol.* 2003;31(3):229–32.
5. Ishrat S. Incidence and pattern of dry eye after cataract surgery. *Saudi J Ophthalmol.* 2019;33(1):34–40.

6. Kumari P, Lakra MD. Comparative Study of Dry Eye after Phacoemulsification and Manual SICS in Tertiary Centre of Jharkhand. *Int J Contemp Med Res.* 2019;6(11):4–8.
7. Maurya RP, Gupta A, Verma S, Singh VP. Sex hormone and dry eye disease :Current update. *IP Int J Ocul Oncol Oculoplast.* 2021;7(2):139–50.
8. Li XM, Hu L, Wang W. Investigation of dry eye disease and analysis of the pathogenic factors in patients after cataract surgery. *Cornea.* 2007;26(9 Suppl 1):16–20.
9. Waris S, Nisar A, Balaji, Naveen RS, Rubina H. To study prevalence of dry eye in diabetic patients. *Ind J Clin Exp Ophthalmol.* 2019;5(1):40–3.

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