EVALUATION OF DRY EYE SYMPTOMS AFTER PHACOEMULSIFICATION

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ABSTRACT

BACKGROUND
One of the most common clinical conditions in ophthalmology practice is dry eyes. It has been documented in various research studies that corneal surgeries including clear corneal Phacoemulsification plays a significant role in the development of dry eyes. This is largely attributable to the injuries suffered by the corneal nerves and corneal surface alteration.

The purpose of the present study is to evaluate the development of dry eye disease after cataract surgery by Phacoemulsification and to study the temporal association of dry eyes and Phacoemulsification.

MATERIALS AND METHODS
The present study was a prospective, single centre, randomized one conducted in the department of Ophthalmology, IQ City Medical College, Durgapur, West Bengal from June 2016 to May 2017. A total of 50 patients were selected from the outpatient department who had undergone uncomplicated clear corneal Phacoemulsification due to senile cataract and who did not have preoperative dry eyes. Dry eye pattern was assessed by Ocular Surface Disease Index (OSDI) score, fluorescein staining and determination of Tear Break up Time (TBUT), corneal and conjunctival fluorescein staining score as per Oxford Schema, and Schirmer Test 1 without anaesthesia (S1T) - all performed in the above consecutive order. Comparison of data was done among mean OSDI score, mean TBUT time and mean ST1 values on 1st week, 4th week and 12th week against preoperative values.

RESULTS
A total of 50 eyes of 50 patients were studied. The age group of the patients ranges from 45 years to 85 years. The mean age was 62 ± 10.357. Most of the cases (84%) had shown significant changes in S1T and TBUT values in the first week. Statistically significant difference in TBUT and OSDI score was noted at the end of 1st week. The values gradually recovered through 4th week and almost attained the preoperative values at the end of 12th week. The risk of developing dry eyes was found to be more pronounced in the elderly age group.

CONCLUSION
Phacoemulsification has emerged as the most preferred method of cataract surgery but ensuing dry eye disease though mostly transient in nature often goes unrecognized. Despite a technically perfect surgery and good visual outcome, often the success is jeopardized by the presence of ocular discomfort due to dry eye disease. In the absence of obvious modifiable risk factors, proper preoperative counseling of the patients regarding possible aggravation of dry eye symptoms, and treatment with tear supplements remain the mainstay of patient satisfaction.

KEYWORDS
Phacoemulsification, Dry Eyes, Corneal Surgery, Cataract Surgery.


BACKGROUND
One of the most common clinical conditions in ophthalmology practice is dry eyes.1 Historically the term "Dry Eyes" was first coined by Andrew De Roetth in 1950. In the following years Dry Eye Disorders (DED) were considered to be multifaceted group of disorders due to decreased tear formation and/ or increased tear evaporation.2 In 2007 the International Dry Eye Workshop (DEWS) revised the definition and classification system.3 The new definition states "Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface."4 The prevalence of dry eyes varies in various studies from 4% to 57%, thereby showing disparity worldwide.4,6 There are many causes and factors leading to dry eye,
including aging, female gender, connective tissue diseases, Diabetes Mellitus, systemic hypertension, contact lens usage, drugs like antihistamines, anticholinergics; antidepressants; oral contraceptives and topical eye drops containing preservatives and ocular diseases like blepharitis, chronic conjunctivitis, meibomitis and pterygium. The symptoms observed in dry eye syndrome include dryness, irritation, burning, foreign body sensation, heaviness of the eyelids, redness, reflex icnimation, ocular pain and fatigue. The symptoms are often chronic and lead to chronic irritation, fluctuating vision, and loss of quality of life. It may cause punctate keratitis, persistent epithelial defect, filamentary keratopathy, superior limbic keratoconjunctivitis and reduced visual acuity. Corneal surgical procedure including PKR, LASIK and cataract surgeries may aggravate existing dry eye disease.\textsuperscript{7-9} as well as may cause temporary dry eye symptoms in previously asymptomatic patients. It has been documented in various research studies that corneal surgeries including clear corneal Phacoemulsification plays a significant role in the development of dry eyes.\textsuperscript{10-12} This is largely attributable to the injuries suffered by the corneal nerves and corneal surface alteration. The purpose of the present study is to evaluate the development of dry eye disease after cataract surgery by Phacoemulsification and to study the temporal association of dry eyes and Phacoemulsification.

MATERIALS AND METHODS
The present study was a prospective, single centre, randomized one conducted in the department of Ophthalmology, IQ City Medical College, Durgapur, West Bengal from June 2016 to May 2017. A total of 50 patients were selected from the outpatient department who had undergone uncomplicated clear corneal Phacoemulsification due to senile cataract and who did not have preoperative dry eyes. Written consent from all the patients was taken prior to surgery. The patient exclusion criteria were previous history of dry eyes or ocular surgery, diabetes mellitus, hypertension, rheumatoid arthritis, ocular pre- medications and trauma. A thorough slit lamp examination was done, intraocular pressure was measured with Schiotz tonometer, and sac syringing was done to exclude nasolacrimal duct obstruction. All the patients underwent clear corneal Phacoemulsification by an incision of 2.75 mm near the superior limbus and about 1 mm side port at about 10 O’ clock position with implantation of foldable intraocular lens in the capsular bag. All the cases were done under local anaesthesia. The operative time was less than 30 minutes in all the cases. All the cases were performed by a single surgeon (SB). Postoperative medications included topical Prednisolone acetate 6 times a day for 7 days tapered over a period of 6 weeks and topical moxifloxacin 4 times a day for 10 days.

Dry eye pattern were assessed by Ocular Surface Disease Index (OSDI) score, fluorescein staining and determination of Tear Break up Time (TBUT), corneal and conjunctival fluorescein staining score as per Oxford Schema, and Schirmer Test 1 without anaesthesia (S1T) - all performed in the above consecutive order. An OSDI score of less than 25 was considered normal. A TBUT was done using a digital clock and appearance of first random dark spot from last complete blink was recorded. A value of less than 10 seconds was taken as abnormal. Schirmer’s test 1, without anaesthesia, was performed with Whatman filter paper (No.41). The filter paper was folded at the end and inserted in the lower fornix at the junction of the middle and lateral third, and eyes gently closed. Reading was directly recorded from the calibrated strip after 5 minutes. A reading of less than 5 mm was considered to be abnormal. The Oxford scheme of grading of corneal and conjunctival staining was used. Standard fluorescein strip and Lissamine green strip were used to stain cornea and conjunctiva respectively. Five areas of the cornea were independently graded based upon a six-point scale (0, 1, 2, 3, 4, 5), where the maximum possible grade was 5. This was evaluated after 30 seconds and within 2 minutes of fluorescein strip application. A value of 2 or greater is indicative of dry eye. Conjunctival scoring was done on a six-point scale (0-5) over 6 areas in the interpalpebral area – 3 on the nasal and 3 on the temporal conjunctiva. Overall score of all the six areas were added with maximum score of 30. Comparison of data was done among mean OSDI score, mean TBUT time and mean S1T values on 1\textsuperscript{st} week, 4\textsuperscript{th} week, and 12\textsuperscript{th} week against preoperative values.

Statistical Analysis- Statistical analysis was done by spreading the information on Excel sheet 2007 and using the SPSS software Version 16.0. Relevant statistical tests like t-test was performed for comparison and interpretation of data. P- value <0.05 was considered significant.

RESULTS
A total of 50 eyes of 50 patients were studied. The age group of the patients ranges from 45 years to 85 years. The mean age was 62 ± 10.357. Table 1 shows the general characteristics of the study. 60% of patients belong to age group of 45 – 65 years. Female patients were 42% of total patients.

<table>
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<td>Age 66 – 85 Years</td>
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Table 1. General Characteristics

Table 2 shows comparative values on 1\textsuperscript{st} week, 4\textsuperscript{th} week and 12\textsuperscript{th} week respectively. Most of the cases (84%) had shown significant changes in S1T and TBUT values in the first week. Statistically significant difference in TBUT and OSDI score was noted at the end of 1\textsuperscript{st} week. The values gradually recovered through 4\textsuperscript{th} week and almost attained the preoperative values at the end of 12\textsuperscript{th} week.
The mainstay of the sympathetic and parasympathetic nervous system is the dorsal root ganglion. These nerves stimulate the lacrimal gland for tear production and tear secretion. In corneal surgeries like clear corneal Phacoemulsification, the integrity of this circuit is disturbed by corneal denervation and results in dry eyes. Phacoemulsification did not change the TBUT and S1T values in dry eyes, though in our study we found higher incidence in male group, 55% after 7 days and 71% at the end of 12th week. Various studies have also demonstrated higher preponderance of dry eyes among female patients, though in our study we found higher incidence in male group, 55% after 7 days and 71% at the end of 12th week. This could be possibly attributed to higher number of male patients (58%) in the study group and a relatively smaller sample size. Nevertheless, the role of topical postoperative medications, due to the presence of preservatives, cannot be overstated in causing a tear film instability and dry eye.

CONCLUSION
From the present study we can reasonably conclude that Phacoemulsification does affect the tear film stability in the postoperative period and the risk increases with age. The magnitude of the problem often remains unrecognized and poorly addressed. In the absence of obvious modifiable risk factors, proper preoperative counseling of the patients regarding possible aggravation of dry eye symptoms, and treatment with tear supplements remain the mainstay of patient satisfaction.

REFERENCES

All the values are expressed as mean ± SD.

Table 2 Comparative analysis of dry eye indices according to post-operative duration.

Table 2 Comparative analysis of dry eye indices according to post-operative duration.

Another important feature observed was that a higher percentage of patients (57%) in the age group of 66 – 85 years showed persistence of dry eye values at the end of 12 weeks.

The above trend of development of dry eyes with respect to different age group in the postoperative period becomes more obvious in the chart shown below. The age group of 45–65 years shows remarkable resilience and almost achieves the baseline value after 12th week; whereas the 66–85 years age group shows a longer recovery time.

As a sheer corollary, estimation of gender distribution of dry eye incidence in the study population was done.

Table 4. Sex Distribution of dry eyes

DISCUSSION
Phacoemulsification has emerged as the most preferred method of cataract surgery but ensuing dry eye disease though mostly transient in nature often goes unrecognized. Despite a technically perfect surgery and good visual outcome, often the success is jeopardized by the presence of ocular discomfort due to dry eye disease.

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