

## ORIGINAL RESEARCH

# Evaluation Of Dry Eye After Phacoemulsification Cataract Surgery In A Tertiary Care Hospital Of Rohilkhand Area

Devendra Jaya<sup>1</sup>, Singh Sneha<sup>2</sup>**ABSTRACT**

**Introduction:** Patients often complain of dry eyes, foreign body sensation and ocular irritation after cataract surgery. This study was aimed to evaluate the changes in tear film status following clear corneal phacoemulsification cataract surgery in a tertiary care hospital in Rohilkhand region.

**Material and Method:** A prospective randomised controlled trial was carried out on 48 patients presenting in our OPD for cataract surgery. Patients with pre-existing ocular or systemic diseases predisposing to dry eyes were excluded from the study. Patients were randomly selected, who underwent cataract surgery by clear corneal phacoemulsification. Their pre and post-operative dry eye status was assessed. The mean tear film break-up time (tBUT) and Schirmer test 1 (ST 1) were taken as evaluating parameters. Subjective evaluation of dry eye was done using Ocular Surface Disease Index (OSDI) grading.

**Result:** Mean tBUT value from pre-operative day to day 60 was reduced from 12 secs (SD=2.45) to 7 secs (SD =2.00). Mean Schirmer Test 1 value reduced from 22.64 ( $\pm$  9.69) on pre-operative day to a final value of 14.29 ( $\pm$  6.09) on day 60. By using OSDI score, 31.25 patients had dry eyes symptoms on day 60.

**Conclusion:** Clear corneal phacoemulsification surgery induces dry eye post-operatively. Subjectively, a higher percentage of patients complained of symptoms of dry eyes.

**Key words:** Dry eye, Clear corneal phacoemulsification, Tear film break up time, Schirmer test 1.

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**INTRODUCTION**

Dry eye was first described by Henrik Sjogren in 1940 as a disease characterised by autoimmune damage to lacrimal gland tissue, decreased tear secretion and ocular surface disorder, and was termed Kerato- Conjunctivitis Sicca. Modern day living, with increased life expectancy, extended computer work and VDU viewing, and higher levels of environmental pollution has resulted in a larger population suffering from this disorder.

Dry eye is estimated to have a prevalence of 5% to 17%, and the prevalence increases with increasing age.<sup>1,2</sup> There is also a reported decrease in the tear fluid concentration of proteins originating from the lacrimal glands with advancing age.<sup>3</sup> Other studies have reported the tear secretion gradually decreasing in patients over 40 years of age, with a linear reduction in precorneal tear film stability with age.<sup>4,5</sup> Patients presenting for cataract surgery mostly belong to the elderly age group, and many have pre-existing mild to moderate dry eyes.

Many patients post cataract surgery are left dissatisfied despite good visual outcome due to persisting complaints of grittiness and foreign body sensation. Corneal incisional surgery has long been identified as one of the risk factors for the development of dry eye.<sup>6</sup> It directly affects quality of vision in addition to symptoms of pain, heaviness and discomfort.

Phacoemulsification is the most preferred technique of cataract surgery nowadays being quick, safe and giving good visual outcome. However, as with other corneal surgeries, it may cause ocular surface and normal tear function disruption post-operatively.<sup>7</sup> Whether its smaller incision size, which has an advantage with respect to reduced astigmatism and quicker visual rehabilitation, also results in inducing no or minimal dry eye is being evaluated.

With the aforementioned points in mind, this study was aimed to find an association between clear corneal phacoemulsification and dry eye, and assess changes in the tear film status pre and post-operatively by use of tear function tests, such as tear film break-up time (tBUT) & Schirmer test 1 (ST-1), and also subjectively assess the dry eye status post operatively by the OSDI questionnaire.

## MATERIAL AND METHOD

This was a prospective randomized clinical study planned for patients undergoing phacoemulsification cataract surgery in the Department of Ophthalmology at Rohilkhand Medical College Hospital. 52 patients of cataract above 40 years of age presenting in the OPD were selected by simple random sampling. Patients with pre-existing dry eyes or any other ocular diseases or ocular injury were excluded from the study. Patients having systemic diseases predisposing to dry eyes like diabetes mellitus, rheumatoid arthritis, Sjögren's syndrome, sarcoidosis, HIV, thyroid disorder, SLE were also excluded. Patients having undergone ocular surgery or on topical lubricants during previous 6 months were also rejected.

An informed consent was taken from all the patients. Study was approved by institutional ethical board.

All selected Patients were evaluated for dry eye status one day prior to cataract surgery (day 0) by using tBUT and ST 1.

Number of patients who underwent phacoemulsification were 52, but 4 patients did not complete the follow up schedule, therefore data was analysed for 48 patients (n=48). All the patients were operated by same surgeon using 2.8mm clear corneal phaco incision and a foldable intraocular lens was implanted. All surgeries were incident free.

The tBUT and ST 1 were repeated on all patients to assess the tear film status & tear secretion on post-operative days 7, 14, 30 & 60.

The Tear film break-up time was performed using a commercially available fluorescein strip moistened with sterile non-preserved saline & inserting in the inferior tarsal conjunctiva. The subject was instructed to blink 3 times, and then look straight without any blink. Tear film was observed on a slit lamp using cobalt blue filter under broad beam. The interval between the last blink and the appearance of the first corneal dry spot was recorded in seconds with a stop watch. This procedure was repeated 3 times and the mean value was taken for analysis. A tBUT value less than 10 seconds was taken as abnormal.

The Schirmer Test 1 was performed using standardized Whatmann filter paper (no.41) which is 5mm wide & 35mm in length. It was folded from the edge and placed in the lateral third of the lower eyelid. Eye was kept open and upwardly fixated with allowance for blinking. The distance of strip moistened from fold to the distal end of wetting on the strip was recorded after 5 min. A reading of less than 10 mm was considered abnormal.

All the tests were carried out under optimum environmental conditions to preclude any other effect on tear

film status by temperature, humidity, and light or air movement.

The subjective evaluation of patients' dry eye status was done on day 60, based on the OSDI questionnaire. The severity of dry eye status was evaluated for each patient employing the clinical parameters of tBUT and ST-1 along with the subjective scores as illustrated in OSDI questionnaire.

## STATISTICAL ANALYSIS

SPSS version 21 was used to generate graphs. Descriptive statistics was used to generate results.

## RESULT

The study included a total of 52 patients who underwent phacoemulsification cataract surgery. The data was analysed for 48 patients as 4 patients did not complete the follow up schedule.

Of these 24 (50%) patients were males & 24 (50%) patients were females. Age range was 42-65 years. The mean age was 52.64 years.

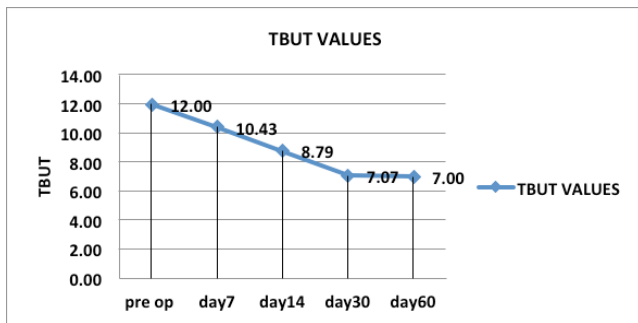
The mean tear film break-up time on day 0 (preoperatively) was 12 seconds (sd=2.45sec). The mean tBUT showed a progressive decline from pre-operative levels up to day 30, with a plateau effect thereafter. The mean tBUT on day 60 was 7 seconds (sd=2.00secs). The *P value* calculated by using the *paired t test* was significantly low ( $p < 0.0001$ ).

The Schirmer test 1 values revealed similar falling tear film parameters. The mean ST 1 value on day 0 was 22.64(± 9.69). It declined from day 7 onwards to a final value of 14.29 (± 6.09) on day 60. There was a statistically significant change ( $p = < 0.0001$ ) in ST-1 values from the pre-operative level noticed from day 7 onwards and lowest around day 60, The fall in ST-1 values were steeper in the initial month and seemed to plateau from day 30.

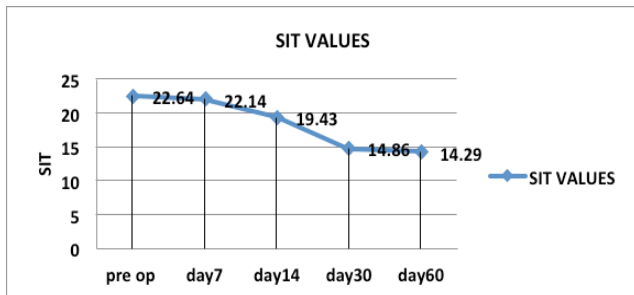
On a subjective basis, utilising the OSDI questionnaire, 15 out of 48 patients (31.25%) were found to have symptoms of dry eye on day 60. Of these, 8 patients (16.66%) showed mild dry eye symptoms, 4 patients (8.33%) showed moderate & 3 patients (6.25%) showed severe degree of dry eye symptoms. 33 patients (68.75%) showed no symptoms of dry eye.

## DISCUSSION

Cataract surgery results are focussed on improving the visual outcome; the post-operative complaints of grittiness, foreign body sensation and dry eyes often receive less importance. While post-operative patients of corneal refractive surgery are aggressively treated



**Graph- 1:** Graphical analysis of mean tBUT values from day 0 to day 60



**Graph- 2:** Graphical analysis of mean ST 1 values from day 0 to day 60

for dry eyes<sup>8,9</sup> doing the same for cataract surgery patients is far less common, even though these patients by virtue of being older, have a higher incidence of confounding factors for dry eye like systemic disease and age related dry eye. The Age Related Dry Eye (ARDE) is a well-recognized primary disease entity, seen with increasing age in normal population where an increase in ductal pathology is said to promote lacrimal gland dysfunction due to its obstructive effect.<sup>10</sup>

In addition it is known that any corneal incisional ocular surgery induces dry eye by multiple factors like cutting of corneal nerves, effect of microscope light, inflammation, ocular surface distortion, and effect of preservatives in eye drops used postoperatively.<sup>11-15</sup>

Phacoemulsification has a small incision size of around 2.8mm, but adding the smaller side port incisions will give us a total arc length of around 4mm. Only a few studies show analysis of phacoemulsification induced ocular dryness<sup>16</sup>. This study was aimed to fill this lacuna and find out if patients undergoing clear corneal phacoemulsification showed significant changes in their tear film status and significant subjective morbidity with regards to dry eye post-operatively.

In this study diagnostic tests of tear film break up time (tBUT) and Schirmer test 1 (ST-1) and subjective analysis through OSDI questionnaire have been included as the evaluating clinical parameters, keeping in view of their ease, economy and acceptability to patients in routine clinical setting. All the patients

were above the age group of 40 years (Range = 40-70-years) since cataract is essentially a geriatric disorder and dry eye a significant cause of ocular discomfort in this age group.

Graphical analysis of tBUT values [ Graph 1] showed a plateau effect evident from day 30 onwards. The final tBUT level in this group was also significantly low ( $p = <0.0001$ ) as compared to pre-operative. This finding is similar to a study in Korea that documented a poorer tear film status (tBUT levels) post operatively following phacoemulsification surgery.<sup>17</sup> However a similar study done by Gharaee et al did not find any change in tBUT values following a temporal clear corneal phacoemulsification surgery.<sup>7</sup> Some studies have also highlighted the relationship of dry eye with size & site of incision, groove verses linear pattern of incision and microscopic light exposure time.<sup>18</sup>

Analysis of ST-1 values revealed a falling tear film parameter very similar to tBUT pattern [ Graph 2]. There was a statistically significant change ( $p = <0.0001$ ) in ST-I values from the pre-operative level, noticed from day 7 onwards and peaking around day 60. The fall in ST-I values were steeper in the initial month and seemed to plateau from day 30. Similar findings were observed in independent studies by Gharaee et al.<sup>7</sup> Cho et al.<sup>17</sup> and Liu et al.<sup>19</sup> These investigators have observed similar pattern with respect to other dry eye parameters of 'Tear meniscus height' (TMH) and Corneal fluorescein staining pattern.

A linear correlation between dry eye parameters and subjective scores could not be established. This confirms earlier reports that OSDI score does not correlate with objective clinical measures of dry eye.<sup>20</sup> Many reports have cited a poorer subjective response among operated patients for months despite an improvement in tBUT & ST-1 values. Our observations indicate a significant number of patients, 31% patients being symptomatic for dry eye 2 months after surgery. Lowest level of both tBUT & ST-1 were recorded at day-60. It was thus inferred that cataract surgeries affect both tear film stability and tear quantity.

## CONCLUSION

Phacoemulsification cataract surgery causes dry eye post-operatively. Parameters like tear film break up time and Schirmer test continue to show tear film dysfunction till two months after cataract surgery. A significant number of patients display dry eye symptoms post operatively. Tear supplements and lubricants should be made a component of post cataract surgery drug regimen, customised according

to patients' tear film status and post-operative subjective complaints.

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