

# Effect of Phacoemulsification on Intraocular Pressure in Patients with Co-Existing Senile Cataract and Primary Glaucomas

Intraocular Pressure in glaucoma with cataract after Phacoemulsification

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## ABSTRACT

**Objective:** To determine the average variation of intraocular pressure in glaucoma patients with cataract after effect of phacoemulsification surgery.

**Study Design:** A quasi-experimental study

**Place and Duration of Study:** This study was conducted at the Ophthalmology Department of Peoples University of Medical Sciences for Women Shaheed Benazir Abad Sindh Pakistan from June to December 2019.

**Materials and Methods:** Researchers examined the effects of phacoemulsification and intraocular lens implants on glaucomatous eyes of patients ages 30 to 80 years. The patient's visual acuity, intraocular pressure, slit lamp examination, funduscopy, visual fields, information regarding topical medications, and pertinent medical history were all documented no more than five days before the cataract surgery was to take place. One day before surgery, one month after surgery, and three months after surgery, intraocular pressure was measured using a Goldman's applanation tonometer. SPSS 20 was used for data analysis.

**Results:** A total of 60 patients were included. We found that males to female's ratio was almost similar, males accounted for 29 (48.33%) of the 60 cases, while females accounted for 31 (51.66%). The mean age of the patients was 51.23 years. As of one month after surgery, the IOP was  $19.44 \pm 0.80$  (Table-2) and at three months it was  $18.01 \pm 1.07$ . There was statistically significant difference of mean change values of intraocular pressure (IOP) after 3 months ( $p=0.0001$ ).

**Conclusion:** Patients with glaucoma who underwent uncomplicated phacoemulsification surgery with an IOL placed in the capsular bag saw a considerable decrease in their intraocular pressure (IOP).

**Key Words:** Glaucoma, Phacoemulsification, Intraocular pressure

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## INTRODUCTION

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Cataract is the clouding of a clear crystalline lens, which reduces visual acuity, whereas glaucoma damages the retinal nerve fiber layer and optic nerve head. (VA).<sup>1</sup>

Cataracts account for 35% of all cases of blindness, whereas glaucoma is responsible for 8% of all cases.<sup>2</sup>

A cataract is the most prevalent cause of blindness in Pakistan (51.50 percent), while glaucoma is the fourth most common cause (7.10%).<sup>3</sup>

Glaucoma is the leading cause of blindness in Pakistan due to the fact that it is the most prevalent glaucoma to be diagnosed late. A recent study found that one-third of those receiving cataract surgery had some degree of glaucoma.<sup>4-6</sup> Optic nerve head and retinal nerve fiber layer damage from glaucoma is a complicated process that can only be managed by reducing intraocular pressure (IOP). Prostaglandin analogue, beta blockers, carbonic anhydrase inhibitors, sympathomimetics, laser iridotomy, trabeculoplasty, and trabeculectomy are all ways to lower IOP.<sup>7</sup> As well as decreasing IOP and aiding in glaucoma management, cataract extraction increases aqueous flow and decreases IOP to varying

degrees by altering anterior chamber structural features, such as raising anterior chamber depth and widening the angle.<sup>8</sup> Cataract extraction is less invasive, quicker, less expensive, and less likely to result in major problems than other glaucoma operations including trabeculectomy and laser glaucoma surgery. Compared to topical and laser therapies, early clear lens extraction in angle closure glaucoma patients is clearly superior as a first-line therapy.<sup>9</sup> There is reversible vision loss in cataracts, which has been substantially improved by phacoemulsification surgery and IOL implants, however in glaucoma, the vision loss is irreversible. Even if patients don't lose their vision totally, the quality of life suffers as a result of the gradual loss of peripheral vision, and decreasing IOP is the cornerstone of treatment to slow the disease's course.<sup>1</sup> Angle closure glaucoma, open angle glaucoma, or ocular hypertension alone have been the focus of most investigations in patients with cataract, and the majority of these individuals had an uncontrolled, high IOP prior to surgery.<sup>10</sup> Patients with diagnosed glaucoma had straightforward phacoemulsification cataract surgery and had an intraocular lens (IOL) implanted in the capsular bag as part of this research to see how their IOP changed on average.

## MATERIALS AND METHODS

From June 20 to December 19, 2021, a quasi-experimental study was carried out in the Ophthalmology Department Peoples University of Medical Sciences for Women Shaheed Benazir Abad Sindh. Open Epi version 3.<sup>11</sup> was used to compute the sample size based on the population mean pre- and post- op IOP of 18.21.3mmHG and 16.31.5mmHg, respectively, with a significance level of 5% and a power of 95%.<sup>8</sup> In the outpatient department, a nonprobability consecutive sampling strategy was used to get the sample (OPD). In this study, we included patients between the ages of 30 and 80 who underwent simple phacoemulsification surgery with an intraocular lens (IOL) placed in the capsular bag and had Snellen VA of 6/12 or less. There were no IOP-lowering surgeries or laser procedures performed on patients with corneal pathology or refractive procedures, history of ocular trauma, UVEI, retinal diseases and axial lengths of less than 21mm or more than 26 mm removed from the study. Basic information was gathered via a form. The VA (Snell chart), IOP (tonometer by Inami), slit lamp (Topcon SL-3D) funduscopy (Volk 90D), visual fields, and pertinent history were documented no more than 5 days before cataract extraction. For pre- and post-surgery measurements, a Goldman applanation tonometer was used to record IOP separately and then average the results. SPSS 20 was used to analyze the data. In terms of quantitative and qualitative data, the mean standard deviation (SD) and percentages were used. Skewness and Kurtosis tests were used to compare the data to

published values and ensure that it was normal. The pre- and post-op IOP readings were compared using a paired sample t. test P 0.05 was considered statistically significant.

## RESULTS

A total of 60 patients were included for this study based on inclusion and exclusion criteria. We found that males to female's ratio was almost similar, males accounted for 29 (48.33%) of the 60 cases, while females accounted for 31 (51.66%). The mean age of the patients was 51.23years. The minimum age of the patient was 30 years, and the maximum age of the patient was 80 years. Out of 60 patients, 42 (70.0%) patients were seen in the age group 30-60 years in majority, and 18 (30.0%) patients were observed in the age group 61-80 years (Table-1). As of one month after surgery, the IOP was 19.44±0.80 (Table-2) and at three months it was 18.01±1.07. There was statistically significant difference of mean change values of intraocular pressure (IOP) after 3 months (p=0.0001) (Table-2 & 3).

**Table No.1: Distribution of patients according to age (n=60)**

Age in years	No. of patients	Percentage
30-60	42	70.0%
61-80	18	30.0%
Total	60	100.0%

Mean ± SD = 51.23 ± 9.44 years.

**Table No.2: Mean change of intraocular pressure (IOP) after one month (n=60)**

IOP	Mean ± SD	P-value
Pre-operative	22.24±1.53	0.0001
After 1 month	19.44±0.80	

SD: Standard deviation.

**TableNo.3: Mean change of intraocular pressure (IOP) after three months (n=60).**

IOP	Mean ± SD	P-value
Pre-operative	21.32±1.58	0.0001
After 3 months	18.01±1.07	

SD: Standard deviation.

## DISCUSSION

Patients with glaucoma who had straightforward phacoemulsification of their cataracts saw a considerable decrease in their IOP. Cataract surgery reduces intraocular pressure, but how exactly it does so is a mystery. Free radicals produced by the phacoemulsification process may act as inflammatory mediators, leading to the breakdown of the blood- aqueous barrier. Another hypothesis is that phacoemulsification increases the secretion rate of endogenous prostaglandins, which could increase uveoscleral expulsion and, as a result, lower aqueous humour secretion. While the phacoemulsification procedure may flush and reduce outflow resistance,<sup>12</sup> it

may also broaden the anterior chamber angle to increase the amount of aqueous outflow that can be achieved. Cerebral intraocular pressure (IOP) was reduced more effectively with an intraocular lens (IOL) of four millimeters (mm) in diameter than with an intraocular lens (IOL) of six millimeters.<sup>13</sup> All patients in our series had a capsulorhexis of 5mm, although the influence of capsulorhexis size on IOP could not be proven convincingly. Phacoemulsification can permanently normalize IOP in eyes with narrow angles by increasing the anterior chamber depth. Cataract surgery reduces the anterior placement of the ciliary processes, resulting in a considerable widening of the angle in eyes with primary angle closure. It has been suggested that patients with stable visual fields and optic nerve morphology who are compliant glaucoma patients on one or two drugs preoperatively undergo corneal phacoemulsification surgery<sup>12,13</sup>. Phacoemulsification has been shown to reduce eye pressure in people with open angle glaucoma.<sup>14,15</sup> There was no distinction made between different kinds of glaucoma in this research, however the overall mean change in IOP following cataract removal was considerable. Patients were not classified based on the kind of glaucoma they had, as all types of glaucoma were included, excluding angle closure, in this study. Patients with cataracts other than intumescent and mature were not stratified based on the kind of cataract they had. As a result, only the total mean IOP change was calculated due to time and resources constraints. Only three months after surgery, IOP was noted.

## CONCLUSION

Patients with glaucoma who underwent uncomplicated phacoemulsification surgery with an IOL placed in the capsular bag saw a considerable decrease in their intraocular pressure (IOP).

### Author's Contribution:

Concept & Design of Study:	Muhammad Khalid Arif Rabani, Attaullah Shah Bukhari
Drafting:	
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**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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