



## **Preoperative Anxiety and its Physiological Impact on Ocular and Surgical Parameters in Cataract Surgery: A Prospective Observational Study**

Mohamed Siddig\*

\*Correspondence to: Mohamed Siddig.

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**Abstract**

**Background:** Preoperative anxiety is a common psychological response among patients undergoing cataract surgery. However, its physiological ocular implications and its potential impact on intraoperative stability have not been sufficiently investigated. Anxiety-related sympathetic activation may induce measurable changes in intraocular pressure, pupillary dynamics, and systemic physiological parameters, potentially affecting the delicate microsurgical environment.

**Objective:** To investigate the relationship between preoperative anxiety levels and physiological ocular and systemic changes in patients undergoing cataract surgery and to evaluate their potential influence on intraoperative stability.

**Methods:** This prospective observational study included patients scheduled for elective phacoemulsification under local anesthesia. Preoperative anxiety was assessed one hour before surgery using the State–Trait Anxiety Inventory (STAI). Physiological parameters were recorded during the baseline preoperative visit and immediately before entering the operating room.

**Results:** Higher anxiety levels were significantly associated with increased intraocular pressure and elevated systolic blood pressure. Patients in the high-anxiety group demonstrated a mean increase of 2.1 mmHg in intraocular pressure compared with baseline values. Systolic blood pressure increased by an average of 12 mmHg. Dilated pupil diameter showed a modest reduction of 0.4 mm in highly anxious patients.

**Conclusion:** Preoperative anxiety is associated with measurable physiological activation that may influence the microsurgical environment of cataract surgery. Incorporating simple anxiety assessment into preoperative protocols may help improve surgical safety and patient experience.

**Keywords:** Preoperative anxiety; Cataract surgery; Intraocular pressure; Sympathetic activation; Pupillary dilation; Phacoemulsification.

## **Introduction**

Cataract surgery is one of the most frequently performed and successful procedures in modern medicine. Despite remarkable technological advances and refined surgical techniques, optimal outcomes depend not only on surgical expertise but also on patient-related physiological and psychological factors.

Preoperative anxiety is particularly common in ophthalmic procedures because most cataract surgeries are performed under local anesthesia while the patient remains conscious. Anxiety activates the sympathetic nervous system and the hypothalamic–pituitary–adrenal axis, leading to the release of catecholamines and various physiological responses such as elevated blood pressure, increased heart rate, and potential changes in intraocular pressure and pupillary muscle tone [1].

In cataract surgery, even subtle physiological changes may influence anterior chamber stability, pupil dilation dynamics, fluidics during phacoemulsification, and patient cooperation during critical surgical steps [2,3].

## **Methods**

### **Study Design**

Prospective single-center observational study.

### **Participants**

Patients with age-related cataract scheduled for elective phacoemulsification under local anesthesia were included in the study.

### **Exclusion Criteria**

Patients with glaucoma, pseudoexfoliation syndrome, previous ocular surgery, use of systemic sedatives prior to surgery, or ocular conditions affecting pupil dilation were excluded.

### **Anxiety Assessment**

Preoperative anxiety was evaluated using the State–Trait Anxiety Inventory (STAI) one hour before surgery. Patients were categorized into three groups according to anxiety levels: low, moderate, and high.

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## Physiological Measurements

Measurements were recorded at two time points: during the baseline preoperative clinic visit and immediately before entering the operating room. Recorded parameters included intraocular pressure measured by Goldmann applanation tonometry, dilated pupil diameter following standard pharmacological dilation, systolic and diastolic blood pressure, and heart rate.

## Statistical Analysis

Pearson correlation analysis, multivariate analysis of variance, and linear regression models were used to analyze the relationship between anxiety levels and physiological variables.

Statistical significance was defined as  $p < 0.05$ .

## Results

The analysis demonstrated a positive association between higher anxiety levels and increased intraocular pressure and systolic blood pressure. Patients in the high-anxiety group exhibited a mean increase of 2.1 mmHg in intraocular pressure compared with baseline values.

Systolic blood pressure increased by an average of 12 mmHg, reflecting sympathetic nervous system activation. Dilated pupil diameter showed a modest reduction of approximately 0.4 mm in highly anxious patients.

During surgery, highly anxious patients required more verbal reassurance and demonstrated a mild tendency toward increased movement, although no surgical complications were observed.

## Discussion

The findings of this study suggest a meaningful association between preoperative anxiety and measurable physiological changes in patients undergoing cataract surgery. Although the magnitude of ocular changes was relatively small, the microsurgical nature of cataract procedures makes even subtle physiological variations potentially relevant.

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Elevated intraocular pressure may influence anterior chamber stability during the early surgical stages, while slight reductions in pupil dilation may increase surgical difficulty in borderline pupil sizes [3].

These findings support the concept that psychological stress can manifest as measurable physiological responses that may influence intraoperative conditions, a relationship previously described in surgical and anesthetic literature [4,5]

## Conclusion

Preoperative anxiety is associated with measurable physiological activation that may influence the delicate environment of cataract microsurgery. Incorporating simple anxiety assessment into preoperative protocols may represent a practical step toward improving surgical safety and enhancing patient comfort.

