RESEARCH ARTICLE

COMPARISON OF SURGERY TIME IN PHACOEMULSIFICATION WITH AND WITHOUT PRE-OP ALPRAZOLAM

Wali Waqar Qureshi, Maham Fazal, Tehmina Nazir, Asfandyar Asghar, Naila Obaid

Department of Ophthalmology, Fauji Foundation Hospital, Rawalpindi Pakistan,
Foundation University Islamabad (FUI), Pakistan

ABSTRACT

Objectives: *To compare the effect of pre-operative administration of oral alprazolam on phacoemulsification time in patients undergoing cataract surgery.*

Study Design: *Case control Study*

Place and Duration of Study: *This was a prospective cohort study conducted at Fauji Foundation Hospital, Rawalpindi from August to September 2024.*

Patients and Methods: *A total number of 100 patients undergoing phacoemulsification with intraocular lens implantation were divided into 2 groups. One received oral alprazolam 1 mg, 1 hour prior to surgery, while the other was not given any medication. Time taken since start of phacoemulsification till the removal of the last piece of nucleus was noted. Results were compiled and the means of the two groups were compared using independent samples t-test.*

Results: *A total of 94 females and 06 males participated in the study. The mean age of the participants was 63.1 ± 7.51 years. There were no significant differences between the two groups in terms of age or gender distribution. In Group A (Alprazolam), the mean surgery time was 4.74 ± 2.09 minutes, whereas in Group B (Control), the mean surgery time was 7.84 ± 2.42 minutes. This difference was statistically significant, with a p-value of less than 0.01.*

Conclusion: *Preoperative administration of oral alprazolam significantly reduces phacoemulsification time in cataract surgery, likely due to reduction in patient anxiety and patient movement during the procedure and therefore enhances surgical outcomes.*

Keywords: *Cataract Surgery, Phacoemulsification, Alprazolam, Conscious Sedation, Surgery Time, Anxiety*

INTRODUCTION

Cataract surgery, particularly phacoemulsification, requires precision and patient stability is critical for achieving optimal outcomes. The procedure typically takes 30 to 60 minutes under normal circumstances, but even minor patient movements such as head tremors or involuntary eye movements can complicate surgery, prolong the operating time and potentially lead to complications.

Patient anxiety is a known factor that increases movement during surgery, especially when patients are conscious. In such cases the high awareness of the patient can exacerbate problem especially in the elderly populations that are more prone to involuntary tremors. Intraoperative head drift and eye movements significantly compromises the quality of surgery and increases the risk of complications, thereby mandating the need of some form of patient relaxation before and during the surgery.[1]

Patient discomfort and pain may occur due to a number of factors such as the light from the operating microscope, handling of the iris, and the insertion of the intraocular lens.[2,3] Preoperative administration of sedatives may help alleviate this anxiety, minimizing movement and thus facilitating a smoother surgical process.

Alprazolam, an anxiolytic drug, has a primary mechanism of action to enhance GABAergic activity in neurons, which promotes relaxation, reduces anxiety and induces mild sedation.[4] This anxiolytic effect is

Correspondence:
Dr. Wali Waqar Qureshi
Department of Ophthalmology, Fauji Foundation Hospital
Rawalpindi Pakistan, FUI, Pakistan
Email: waliwaqar@yahoo.com
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particularly important in surgical contexts where patient cooperation is critical.

Previous studies have shown usage of other agents like fentanyl in cataract surgery in conjunction with topical anesthesia to reduce pain and anxiety with some success.[5,6] Alprazolam, an over-the-counter benzodiazepine commonly prescribed for anxiety has been hypothesized to improve surgical efficiency when administered preoperatively by inducing conscious sedation. This study aimed to investigate the effect of preoperative alprazolam on the phacoemulsification time in patients undergoing routine cataract surgery.

PATIENTS AND METHODS

This was a prospective cohort study conducted at a tertiary care hospital from August to September 2024. The study compares two groups of patients undergoing phacoemulsification cataract surgery. One group received preoperative alprazolam while the other was a control group which received no sedation.

The study included patients aged 49 to 79 years undergoing routine cataract surgery. Participants were divided into two groups: Group A (Alprazolam group) patients received a 1 mg dose of alprazolam 1 hour before surgery while Group B (Control group) patients received no sedative preoperatively. Informed consent was taken from all participants and approval for the study was obtained from the institutional ethics committee.

Patients were selected through non-probability consecutive sampling. The inclusion criteria for this study required participants to be between 40 and 80 years of age, eligible for routine cataract surgery with nuclear sclerosis (NUC standard 2), based on the WHO Cataract Grading Scale 2002. Exclusion criteria included those with known benzodiazepine allergies, pre-existing neurological conditions that cause tremors, or severe systemic illnesses such as uncontrolled diabetes or hypertension. Patients with conditions that could extend surgery duration such as small pupils, pseudoexfoliation syndrome, zonular weakness, prior intraocular surgeries, traumatic or brown cataracts, mature or hypermature cataracts, posterior polar cataracts, corneal haze, or hearing impairments were also excluded.

The protocol for phacoemulsification cataract surgery was as follows: The subjects' eyes were topically anesthetized using proparacaine hydrochloride 0.5% and dilated using tropicamide 1%. The patients in the alprazolam group were given an oral dose of 1 mg alprazolam about 1 hour before the scheduled surgery time. Intracameral anesthesia was achieved using 1% lignocaine. The procedure was carried out under aseptic measures by experienced surgeons using standard equipment and applying similar technique (stop and chop). Phacoemulsification time was defined as the time from the start of phacoemulsification (sculpting) till the removal of the last nuclear fragment with the phaco probe. An intraocular lens was implanted in the capsular bag and intracameral moxifloxacin was injected. Postoperatively the patients were treated with topical moxifloxacin 0.5% and prednisolone acetate 1% eyedrops every two hours for the first week. Oral mefenamic acid tablets were provided as needed for pain relief. Patients were assessed both preoperatively and on the first postoperative day before being discharged and given 1 week postoperative follow-up.

All patients underwent phacoemulsification cataract surgery under topical anesthesia performed by consultant ophthalmologists of similar surgical experience using standardized equipment and similar technique (stop and chop) in order to minimize any confounding factors. All surgeries went uneventful and no intra-operative or post-operative complications were encountered.

The outcome measure for this study was the mean phacoemulsification time, recorded in minutes, for both groups. Data were analyzed using IBM SPSS software (version 23). The mean phaco time between the two groups was compared using an independent samples t-test. A p-value of < 0.05 was considered statistically significant.

RESULTS

A total of 100 patients (94 females, 6 males) were included in the study, with 50 patients in each group. The mean age of participants was 63.1 ± 7.51 years. There were no significant differences between the two groups in terms of age or gender distribution (Table I).

Table I: Age and gender distribution

Demographics	Alprazolam Group (n=50)	Control Group (n=50)
Mean Age (years)	63.38 ± 5.90	62.82 ± 8.89
Gender (M/F)	3/47	3/47

The mean phacoemulsification time in the alprazolam group was significantly shorter as compared to the control group. In Group A (Alprazolam), the mean surgery time was 4.74 ± 2.09 minutes, whereas in Group B (Control), the mean surgery time was 7.84 ± 2.42 minutes. The mean difference was compared between the two groups using an independent samples t-test, which was statistically significant, with a *p*-value of less than 0.01.

Table II : Mean Phacoemulsification Time

	Alprazolam Group	Control Group	*p*-value
Mean Phacoemulsification Time (minutes)	4.74 ± 2.09	7.84 ± 2.42	<0.01

DISCUSSION

This study sought to determine whether the administration of preoperative alprazolam, a benzodiazepine is known for its anxiolytic and sedative properties could reduce phacoemulsification time in cataract surgery by mitigating patient movement and anxiety. The results demonstrate a statistically significant reduction in mean phacoemulsification time in the group receiving preoperative alprazolam compared to the control group, supporting the hypothesis that sedation enhances surgical efficiency. These findings are consistent with previous studies showing that anxiolytic medications improve intraoperative conditions by reducing patient anxiety and physical movement.[7]

In this study, patients who received alprazolam were found to be more relaxed, which likely led to fewer involuntary movements, such as head tremors or muscle twitches. These movements can occur due to anxiety, and in elderly populations, conditions like essential tremors are more common[8] which can exacerbate difficulties during surgery. By alleviating both anxiety and physical restlessness through its physiological and psychological effects, alprazolam created a more controlled operative environment, allowing the surgeon to complete the phacoemulsification process more efficiently.

Moreover, it is well-established that cataract surgery involves fine, delicate movements under a microscope, with high precision required to break up and remove the lens using ultrasonic energy. Any interruption due to patient movement requires the surgeon to pause, refocus, and readjust, thereby prolonging the procedure. Our findings suggest that sedation prevents these interruptions, reducing the need for such pauses and adjustments, which translates into shorter overall surgery time.

Previous studies in cataract surgery have examined various methods to improve patient cooperation and reduce surgery times. For example, conscious sedation using midazolam, another benzodiazepine did not enhance patient comfort or reduce anxiety during cataract surgery.[9] In addition its prolonged effects postoperatively also made it unsuitable for shorter surgeries.[10] However, alprazolam, being an oral agent with a rapid onset of action and relatively short half-life, offers a practical and non-invasive alternative to intravenous sedatives like midazolam.[11]

The results of our study align with findings in other surgical fields where preoperative anxiety reduction leads to more favorable intraoperative conditions.[12] Not only this, but preoperative anxiety played a significant role in patient experience postoperatively as well.[13,14] However, there is relatively limited research specifically focusing on the use of preoperative alprazolam in ophthalmology. This study contributes to the growing body of evidence that oral sedatives can enhance the operative environment, particularly in precision-based surgeries like phacoemulsification.

The reduction in surgery time observed in this study carries several important clinical implications. Shorter surgeries are generally associated with a reduced risk of intraoperative complications, such as corneal endothelial damage, fluid mismanagement, or inadvertent trauma to ocular structures.[15] Phacoemulsification is energy-dependent, and prolonged surgeries often require higher cumulative energy levels, which can contribute to postoperative inflammation or corneal swelling.[16] By reducing the surgery time, the amount of energy delivered to the eye is likely minimized, potentially leading to better visual recovery and fewer postoperative complications.

Additionally, shorter surgery times improve the efficiency of the operating room, allowing more patients to be treated within the same time frame. This is particularly relevant in high-volume ophthalmic centers, where optimizing surgical throughput can significantly improve patient access to care and reduce waiting times for elective surgeries. Moreover, shorter

surgical duration and subsequently higher surgical volume is also economically advantageous as it can reduce overall healthcare costs, making this a potentially cost-effective intervention.[17]

While we did not formally assess patient satisfaction in this study, anecdotal reports from both patients and staff suggested that the alprazolam group appeared more comfortable and cooperative during the procedure.

While this study provides compelling evidence for the use of preoperative alprazolam, several limitations should be considered. First, the sample size was relatively small, which may limit our ability to generalize the findings. A larger study population would provide more robust data and allow for subgroup analyses, such as assessing the effects of alprazolam in patients with high preoperative anxiety versus those with lower anxiety levels. While every effort was made to include cataracts of similar grade, we acknowledge that grading of the cataracts was subjective at best and therefore served as a confounding factor.

Furthermore, this study had a significant gender bias (females 94; males 6). However, this difference proved advantageous for our study as it has been demonstrated that females are more prone to anxiety disorders in general and pre-operative anxiousness in specific.[18,19]

Additionally, we did not measure postoperative recovery time or complication rates in detail, which could be important secondary outcomes in future research. While no significant intraoperative complications were observed, a more comprehensive analysis of postoperative outcomes, including visual acuity, corneal edema, and patient-reported satisfaction, would further elucidate the broader benefits of preoperative alprazolam use.

Future studies could explore the impact of different doses or types of sedatives on cataract surgery outcomes, as well as examine the long-term benefits of reduced surgery time, such as improved postoperative recovery and visual function. It would also be valuable to conduct a cost-benefit analysis of using alprazolam routinely in cataract surgeries to assess whether the reduction in surgery time and potential improvement in outcomes justify the additional cost of preoperative sedation. Additionally, exploring the use of preoperative alprazolam in more complex cataract surgeries, such as cases with denser cataracts or patients with comorbidities, could further expand its clinical application.

CONCLUSION

This study demonstrates that preoperative administration of alprazolam significantly reduces phacoemulsification time in cataract surgery, likely due to its ability to reduce anxiety and patient movement during the procedure. The use of conscious sedation in routine cataract surgeries may improve surgical efficiency, reduce complications and enhance the overall patient experience.

CONFLICT OF INTEREST

None.

SOURCE OF FUNDING

None.

ETHICAL STATEMENT

All subjects gave their informed consent for inclusion before they participated in the study. All procedures performed in this study involving human participants were conducted ethically according to the ethical standards of the Ethical Review Board of Fauji Foundation Hospital Rawalpindi (vide letter no. 850/RC/FFH RWP dated 20/06/2024).

Authors' Contributions:

Wali Waqar Qureshi: Conception of study/Designing/ Planning, Experimentation/Study Conduction, Analysis/Interpretation/Discussion, Manuscript Writing, Critical Review, Facilitated for Reagents/Material Analysis

Maham Fazal: Experimentation/Study Conduction, Analysis/Interpretation/Discussion, Manuscript Writing

Tehmina Nazir: Manuscript Writing, Critical Review

Asfandyar Asghar: Critical Review

Naila Obaid: Critical Review

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