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Original Research Article

Effect of alprazolam 0.5 mg on patients' experience of anxiety and pain during peribulbar block injections for cataract surgery

Bhawna Chawla[1], Manika Sharma[1], Kanav Gupta[1*], B K Gupta[1]

[1]Dept. of Ophthalmology, NC Medical College and Hospital, Panipat, Haryana, India

Abstract

Background: Cataract surgery is one of the most common ophthalmic procedures, often performed under regional anaesthesia with a peribulbar block. Preoperative anxiety, prevalent among surgical patients, can adversely affect anaesthesia requirements, pain perception, and surgical outcomes. This study evaluates the effects of alprazolam (0.5 mg) on anxiety and pain in patients undergoing cataract surgery with peribulbar block.

Materials and Methods: This single-centre, prospective study included 80 adult patients with ASA physical status I–II, randomized into two groups: Group A (n=40) received 0.5 mg alprazolam, while Group P (n=40) received a placebo multivitamin tablet, administered orally 60–90 minutes before surgery. Anxiety levels were measured using the State-Trait Anxiety Inventory (STAI) scale, and postoperative pain was assessed using the Numeric Pain Rating Scale (NPRS). Data on anxiety, pain, and adverse effects were analysed statistically.

Results: Alprazolam significantly reduced preoperative anxiety. Patients in Group A showed fewer cases of severe anxiety (6 patients postoperatively, STAI = 45–80) compared to Group P (10 patients, $p < 0.05$). Postoperative pain was also lower in Group A, with 30 patients reporting minimal pain (NPRS < 3) immediately after surgery, increasing to 38 patients by 24 hours. In contrast, Group P had only 8 patients with NPRS < 3 initially, increasing to 36 by 24 hours ($p < 0.001$). No cases of severe pain were reported in Group A, while mild side effects, such as dizziness, were noted in 10 patients.

Conclusion: Preoperative administration of alprazolam significantly reduces anxiety and postoperative pain, enhancing patient comfort and surgical outcomes in cataract surgery under peribulbar block. Its favourable safety profile makes it a valuable addition to preoperative care protocols.

Keywords: Alprazolam, Cataract surgery, Peribulbar block, Anxiety, Postoperative pain, Preoperative care.

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1. Introduction

Cataract extraction with intraocular lens (IOL) implantation is among the most frequently performed ophthalmic surgeries, often requiring regional anaesthesia, with the peribulbar block being the technique of choice worldwide.[1] A commonly employed anaesthetic combination for this procedure includes equal volumes of 0.5% bupivacaine and 2% lignocaine, augmented with hyaluronidase.[2]

Anxiety, characterized as a heightened emotional state involving apprehension and anticipation of harm, manifests through both behavioural and physical symptoms.[3] The perioperative phase is particularly anxiety-inducing, with preoperative anxiety emerging as a major concern due to its potential to impact anaesthesia and surgical outcomes significantly.[4-7] Excessive preoperative anxiety can lead to clinical challenges, including heightened anaesthetic requirements, hemodynamic instability, increased postoperative pain, delayed wound healing, infection risks, procedure cancellations, extended hospital stays, and diminished patient satisfaction.[8-11] This anxiety, driven by autonomic nervous system (ANS) activation and neuroendocrine changes, results in elevated heart rate, blood pressure, and myocardial workload.[12-14]

The prevalence and intensity of preoperative anxiety vary, influenced by factors such as the type of surgery, gender, individual traits, reasons for surgery, and educational background. It also plays a critical role in modulating postoperative pain, with studies revealing a direct correlation between heightened anxiety levels and increased pain

*Corresponding author: Kanav Gupta
Email: kanavg@hotmail.com

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perception.[15-18] Previous interventions targeting preoperative anxiety have demonstrated efficacy in reducing postoperative pain, underscoring the importance of managing this interplay.[15,19]

Pain, a multifaceted and subjective experience, encompasses sensory, emotional, and cognitive dimensions.[20] Its postoperative intensity often stems from nociceptive stimulation, insufficient analgesia, and the patient's emotional state, all of which influence anxiety and behavioural responses.[21] Addressing the dynamic relationship between preoperative anxiety and postoperative pain is crucial for minimizing their combined effects.

Pharmacological approaches, particularly the use of benzodiazepines, have gained prominence in mitigating anxiety in medical settings. Alprazolam, a benzodiazepine, exerts its anxiolytic effects by binding to the GABA-A receptor in the central nervous system.[22] The binding site for benzodiazepines resides between the alpha-1 and gamma-2 subunits of this receptor, with research suggesting that the alpha-2 and alpha-3 subunits primarily mediate anxiolytic effects.[23] By enhancing GABA's affinity for its receptor, benzodiazepines potentiate inhibitory neurotransmission, leading to sedation and reduced anxiety. Administering benzodiazepines as part of preoperative care fosters a holistic approach, ultimately enhancing patient outcomes and satisfaction.

Anxiety levels are often measured using the State-Trait Anxiety Inventory (STAI), a globally recognized tool. Originally designed for adult research, it has proven versatile across different populations. The STAI distinguishes between state anxiety (A-State), a transient emotional condition marked by tension and heightened ANS activity, and trait anxiety (A-Trait), which reflects a stable predisposition to react with anxiety to perceived threats.[24] This study specifically assessed trait anxiety. Postoperative pain, on the other hand, is frequently evaluated using the Numeric Pain Rating Scale (NPRS), an 11-point scale ranging from 0 (no pain) to 10 (worst pain).[25]

The objective of this research is to evaluate the impact of administering 0.5 mg of alprazolam on alleviating anxiety and pain during peribulbar block injections for cataract surgery.

2. Materials and Methods

This single-centre, prospective study was conducted in the Department of Ophthalmology at N.C. Medical College, Israna, Panipat, over a two-month period from August 2023 to September 2023. Institutional ethical approval was obtained, and written informed consent was secured from all participants. The study included 80 adult patients, aged 18 years or older, with ASA physical status I–II, who were scheduled for cataract surgery. Patients were excluded from the study if they were using medications such as analgesics, sedatives, antiepileptics, or antidepressants. Additional exclusion criteria included individuals with known allergies or contraindications to the study drugs, as well as those with a history of gastric ulcers, obesity (BMI ≥28), neuropsychiatric or endocrine disorders, or substance abuse. These criteria ensured the selection of a homogenous study population and minimized potential confounding factors that could influence the study outcomes.

Participants were randomized into two groups:

1. Group A (n=40): Received 0.5 mg alprazolam (Alprax, manufactured by Torrent Pharmaceuticals Ltd, Ahmedabad, India) orally, 60–90 minutes before administration of the peribulbar block.
2. Group P (n=40): Received a placebo multivitamin tablet (Zincovit, manufactured by Apex Laboratories Pvt Ltd, Ghaziabad, India) orally, 60–90 minutes prior to the peribulbar block.

2.1. Anxiety assessment

Baseline anxiety levels were measured using the State-Trait Anxiety Inventory (STAI A-Trait) scale. This validated tool comprises 20 statements, each rated on a 4-point scale from 1 ("Usually never") to 4 ("Usually always"). Higher scores indicate greater anxiety, with a range from 20 (minimum) to 80 (maximum). To ensure accurate reporting, patients were counselled in private, emphasizing the normalcy of preoperative anxiety and encouraging honest responses.

2.2. Anesthesia protocol and monitoring

Anaesthesia administration was standardized across both groups, with peribulbar block being the technique of choice. Standard intraoperative monitoring included pulse oximetry, ECG, and blood pressure. All procedures were performed under uniform surgical and anaesthetic conditions.

2.3. Pain assessment

Postoperative pain was evaluated using the Numeric Pain Rating Scale (NPRS), an 11-point scale where 0 indicates "no pain" and 10 represents the "worst pain imaginable." Pain levels were recorded. This standardized pain assessment provided insights into the relationship between preoperative anxiety and postoperative pain outcomes.

3. Results

The study evaluated the impact of preoperative administration of Alprazolam 0.5 mg on anxiety and pain levels in patients undergoing cataract surgery with peribulbar block. Data from 80 patients were analysed, with demographic characteristics well-matched between the two groups, ensuring comparability. The results are presented in terms of anxiety scores, pain levels, and adverse effects, providing a comprehensive understanding of Alprazolam's efficacy and safety.

Table 1: Demographic details and ASA grading of the patients

Demographic characteristics	Group A (n=40)	Group P (n=40)	P value
Age (in years) (mean ± SD)	66.15 ± 10.47	66.4 ± 11.50	0.9431
Gender(male/female)	12/28	8/32	0.961
The side of the eye was operated (Right/Left)	28/12	24/16	0.814
ASA grade I/II	24/16	20/20	0.887
Type of block	All Peribulbar Block	All Peribulbar Block	-

ASA: American Society of Anaesthesiologists

Table 2: Comparative study of STAI score in different groups

STAI (Score)	Group	At Admission	Before Surgery	After Surgery	At Discharge
<37	A	18	26	16	28
	P	12	14	18	18
38-44	A	12	4	18	10
	P	16	14	12	10
45-80	A	10	10	6	2
	P	12	12	10	12

STAI: State-trait anxiety inventory

Table 3:

NPRS	Group	After Surgery	8 Hours After Surgery	24 Comparative study of NPRS score in different groups. Hours After Surgery	p-value
< 3	A	30	38	38	< 0.001
	P	8	34	36	
4-5	A	10	2	2	0.001
	P	26	6	4	
6-7	A	0	0	0	0.776
	P	2	0	0	
>7	A	0	0	0	0.571
	P	4	0	0	

NPRS: Numeric pain rating scale

The demographic and clinical characteristics of patients in Groups A and P were comparable in

Table 1. The mean age was 66.15 ± 10.47 years in Group A and 66.4 ± 11.50 years in Group P (P = 0.9431). Gender distribution showed a slightly higher proportion of females in both groups (Male/Female ratio: 12/28 vs. 8/32, P = 0.961). The laterality of surgery (Right/Left) and ASA grading (I/II) were also similar, with no significant differences (P = 0.814 and P = 0.887, respectively). All patients underwent peribulbar block anaesthesia. This uniformity establishes a robust foundation for comparing outcomes between the two groups.

Table 2 shows significant differences in anxiety levels between Group A and Group P. In the low anxiety category (<37), Group A exhibits a notable increase in patients, rising from 18 to 26, reflecting effective anxiety reduction. Group P, however, shows only a slight increase, from 12 to 14. For moderate anxiety (38–44), Group A demonstrates a remarkable drop from 12 to 4 patients, suggesting successful preoperative anxiety management, while Group P remains unchanged at 14. These trends highlight Group A's significant preoperative improvement, contrasting with Group P's static pattern.

Table 3, the study revealed that preoperative administration of alprazolam significantly reduced postoperative pain compared to placebo in patients undergoing cataract surgery with a peribulbar block. In Group A (Alprazolam), 30 patients reported minimal pain (NPRS < 3) immediately after surgery, increasing to 38 patients at 8 and 24 hours, compared to only 8 patients in Group P (Placebo) initially, rising to 34 and 36 patients at 8 and 24 hours, respectively (p < 0.001). Moderate pain (NPRS 4–5) was reported by 10 patients in Group A initially, decreasing to 2 patients by 8 and 24 hours, while Group P had 26 patients with moderate pain after surgery, reducing to 6 and 4 patients at 8 and 24 hours (p = 0.001). Severe pain (NPRS 6–7) and very severe pain (NPRS > 7) were not observed in Group A, whereas 2 and 4 patients in Group P

reported these levels immediately post-surgery ($p = 0.776$ and $p = 0.571$). These results confirm the efficacy of alprazolam in reducing pain intensity, emphasizing the importance of managing preoperative anxiety to enhance postoperative outcomes.

4. Discussion

This study evaluated the impact of preoperative alprazolam (0.5 mg) on anxiety and pain during peribulbar block injections in cataract surgery. The findings demonstrated that patients who received alprazolam were significantly less anxious before and after surgery compared to those given a placebo. Six patients in the alprazolam group exhibited severe anxiety (STAI = 45–80) postoperatively, compared to ten patients in the placebo group. Remarkably, no patients in the alprazolam group experienced severe pain after surgery, whereas four patients in the placebo group reported it ($p = 0.571$). Pain was predominantly mild in the alprazolam group, contrasting with moderate to severe pain in the placebo group. By 8 hours post-surgery, severe pain was absent in both groups. Mild side effects such as dizziness and nausea occurred in ten alprazolam patients, with no cases of deep sedation, reaffirming its safety.

Benzodiazepines, including alprazolam, are frequently recommended for surgical patients due to their established short-term safety and efficacy. By enhancing gamma-aminobutyric acid (GABA) activity, they provide sedative, anxiolytic, and muscle relaxant effects, significantly improving psychological well-being and early postoperative pain management. Alprazolam offers unique advantages among benzodiazepines, including antidepressant properties akin to tricyclic antidepressants.[22] Notably, no prior studies have explored the combined impact of benzodiazepines on depression, anxiety, and analgesic requirements in cataract patients undergoing peribulbar block, a gap this study aimed to address.

Previous research has primarily assessed anxiety in ophthalmic procedures. Segal et al.[26] reported increased anxiety in 25% of patients before injections, while Senra et al.[27] noted similar findings for intravitreal injections. Studies by Khezri et al.[28] and Pathak et al.[29] highlighted the efficacy of gabapentin and melatonin in reducing anxiety and pain during retrobulbar block. Ghai et al.,[30] in a meta-analysis, observed statistically significant reductions in anxiety with gabapentin and pregabalin, further emphasizing the importance of preoperative anxiolytics.

This study underscores the efficacy of alprazolam in reducing anxiety and improving postoperative outcomes, marking a step forward in enhancing patient comfort in cataract surgery.

5. Conclusion

This study underscores the transformative role of alprazolam (0.5 mg) in enhancing patient experiences during cataract surgery under peribulbar block. Patients who received alprazolam exhibited significantly reduced anxiety levels, both pre- and postoperatively, compared to those on placebo. Furthermore, postoperative pain was markedly lower in the alprazolam group, with no reports of severe pain beyond eight hours post-surgery, showcasing its efficacy in mitigating discomfort. The drug's safety profile was reinforced by the absence of deep sedation and only mild, transient side effects like dizziness and nausea.

The findings align with the evolving landscape of cataract surgery, where the emphasis on regional anaesthesia demands strategies to alleviate perioperative anxiety. Alprazolam, with its potent anxiolytic and antidepressant properties, proves to be an invaluable adjunct, promoting psychological well-being and reducing nociceptive responses. By tailoring premedication to address individual anxiety levels, surgeons can achieve optimal surgical outcomes and elevate patient satisfaction.

6. Future Implications

While the anxiolytic effects of benzodiazepines like alprazolam are well-documented, their specific role in the context of cataract surgery with peribulbar block has been underexplored. This study fills a critical gap by demonstrating the impact of alprazolam on both anxiety and postoperative pain in a controlled ophthalmic setting. Unlike generalized studies on benzodiazepines, this research offers targeted insights into the unique physiological and psychological challenges associated with peribulbar anaesthesia, where patient cooperation and comfort are paramount.

The findings provide a foundation for refining preoperative protocols in ophthalmology, emphasizing the importance of individualized anxiety management for improving surgical outcomes. Future studies could build on this work by exploring alprazolam's effects in different surgical settings, optimizing dosing regimens, or combining it with non-pharmacological strategies like cognitive behavioural therapy or guided relaxation techniques. This focused approach could set new benchmarks for perioperative care, enhancing patient satisfaction and clinical efficiency.

7. Source of Funding

None.

8. Conflict of Interest

None.

9. Patient Consent

Written informed consent was taken from the participants after explaining in detail about the study protocol, all consequent benefits and risks in their mother tongue.

10. Ethics Committee Approval

Approval from the hospital ethical committee has been taken.

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