

**Hazards of Medical Glaucoma Therapy in Cataract Patients**Shivani<sup>1</sup>, Anshul Verma<sup>2</sup>, Rajiv Kumar Singh<sup>3</sup><sup>1</sup>SR, Department of Ophthalmology, SKMCH, Muzaffarpur, Bihar, India<sup>2</sup>SR, Department of Ophthalmology, SKMCH, Muzaffarpur, Bihar, India<sup>3</sup>HOD, Department of Ophthalmology, SKMCH, Muzaffarpur, Bihar, India

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Corresponding Author: Shivani

Conflict of interest: Nil

**Abstract:**

**Background:** Pharmacological intervention is the primary treatment for glaucoma, designed to lower intraocular pressure and avert optic nerve injury. In patients with concurrent cataract, apprehensions have emerged about the long-term safety of topical anti-glaucoma medicines, including their propensity to induce ocular surface damage and affect cataract progression.

**Objective:** To assess the risks linked to medical glaucoma treatment in patients with concurrent cataract, particularly regarding adverse drug reactions and the advancement of lens opacity.

**Methods:** A retrospective observational study was performed on 150 individuals diagnosed with both glaucoma and cataract over the course of one year. Data pertinent to demographics, categories of anti-glaucoma drugs (beta-blockers, prostaglandin analogs, and carbonic anhydrase inhibitors), occurrence of adverse effects, and cataract advancement status were extracted from medical records. A chi-square test was conducted to evaluate the relationship between medication type and outcomes, with a p-value of less than 0.05 being statistically significant.

**Results:** Adverse effects occurred in roughly 40% of individuals, predominantly manifesting as eye irritation and dryness. Despite beta-blockers and carbonic anhydrase inhibitors exhibiting a somewhat increased incidence of adverse effects, the correlation between medication type and adverse effects was not statistically significant ( $p = 0.56$ ). No significant correlation was identified between the kind of anti-glaucoma medicine and cataract advancement ( $p = 0.75$ ), suggesting that lens alterations were not substantially affected by medical treatment during the study period.

**Conclusion:** Medical treatment for glaucoma seems to be comparatively safe for patients with concurrent cataract. Mild side effects are rather prevalent; however, they do not exhibit a substantial correlation with certain drug classes. No evidence was discovered indicating that these drugs hasten cataract progression. Consistent oversight and personalized therapy are crucial for good patient management.

**Keywords:** glaucoma, beta-blockers, carbonic anhydrase inhibitors, anti-glaucoma, prostaglandin analogs.

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**Introduction**

Glaucoma and cataracts are prevalent causes of vision impairment and blindness globally, especially impacting the elderly demographic. As life expectancy rises, the simultaneous occurrence of these two disorders has become more prevalent in clinical practice. Managing patients with concurrent glaucoma and cataract has distinct challenges, as therapeutic approaches for one ailment may affect the course of the other. Pharmacological treatment is the primary strategy in glaucoma care, including medicines such as beta-blockers, prostaglandin analogs, and carbonic anhydrase inhibitors. These pharmaceuticals are efficacious in reducing intraocular pressure and averting optic nerve impairment [1].

Nonetheless, prolonged use of topical anti-glaucoma drugs carries inherent hazards. Numerous studies

indicate that prolonged exposure to these medications, especially those with preservatives, might result in ocular surface toxicity, conjunctival inflammation, tear film instability, and patient discomfort. Benzalkonium chloride, a commonly utilized preservative in ocular formulations, has been associated with epithelium damage and inflammatory alterations. Furthermore, there is increasing apprehension that extended usage of specific drugs may affect lens metabolism and perhaps lead to cataract advancement or diminished lens clarity [2].

Considering these issues, it is essential to assess the safety profile of medical glaucoma treatment in individuals with pre-existing cataracts. Comprehending the potential risks enables clinicians to make informed choices for drug

selection and oversight [3]. This study seeks to evaluate the negative consequences of medical glaucoma treatment and to ascertain its influence on cataract advancement in affected individuals.

**Methods**

**Study Design:** Retrospective observational study.

**Study Duration:** 1 year.

**Sample Size:** 150 patients.

**Inclusion Criteria:**

- Diagnosed glaucoma patients on medical therapy
- Coexisting cataract

**Exclusion Criteria:**

- Previous ocular surgery
- Traumatic cataract
- Systemic diseases affecting the lens

**Data Collected:**

- Age and gender
- Type of anti-glaucoma medication
- Presence of adverse effects
- Cataract progression status

**Statistical Analysis:**

- Chi-square test used
- $p < 0.05$  considered significant

**Results**

**Table 1: Demographic Distribution of Study Population**

Variable	Frequency (n=150)	Percentage (%)
Age < 50	65	43%
Age 50–70	40	26.6%
Age > 70	45	30%
Male	75	50%
Female	75	50%

**Table 2: Association Between Medication Type and Adverse Effects**

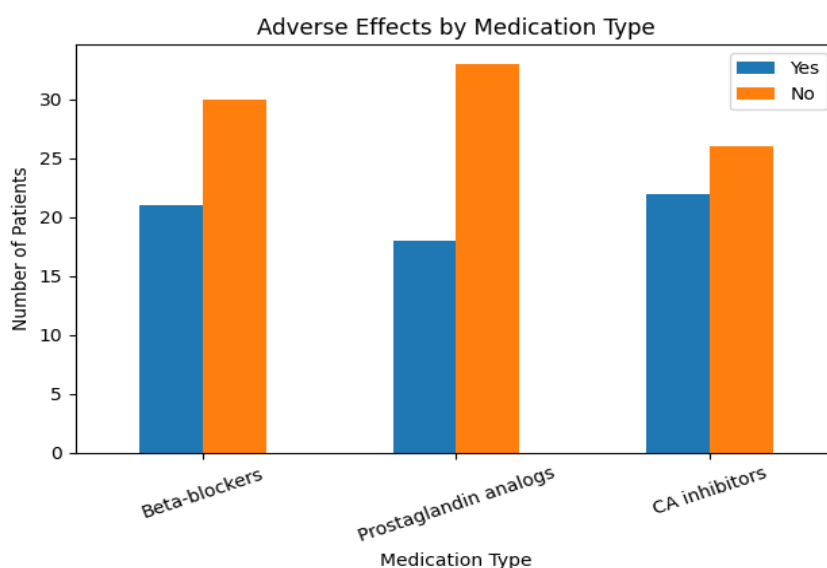
Medication Type	Adverse Effects Present	Absent	Total
Beta-blockers	21	30	51
Prostaglandin analogs	18	33	51
Carbonic anhydrase inhibitors	22	26	48

p-value = 0.56 (Not significant)

**Table 3: Association Between Medication Type and Cataract Progression**

Medication Type	Progressed	Stable	Total
Beta-blockers	15	36	51
Prostaglandin analogs	14	37	51
Carbonic anhydrase inhibitors	11	37	48

p-value = 0.75 (Not significant)



**Figure 1: Adverse effects by medication type**

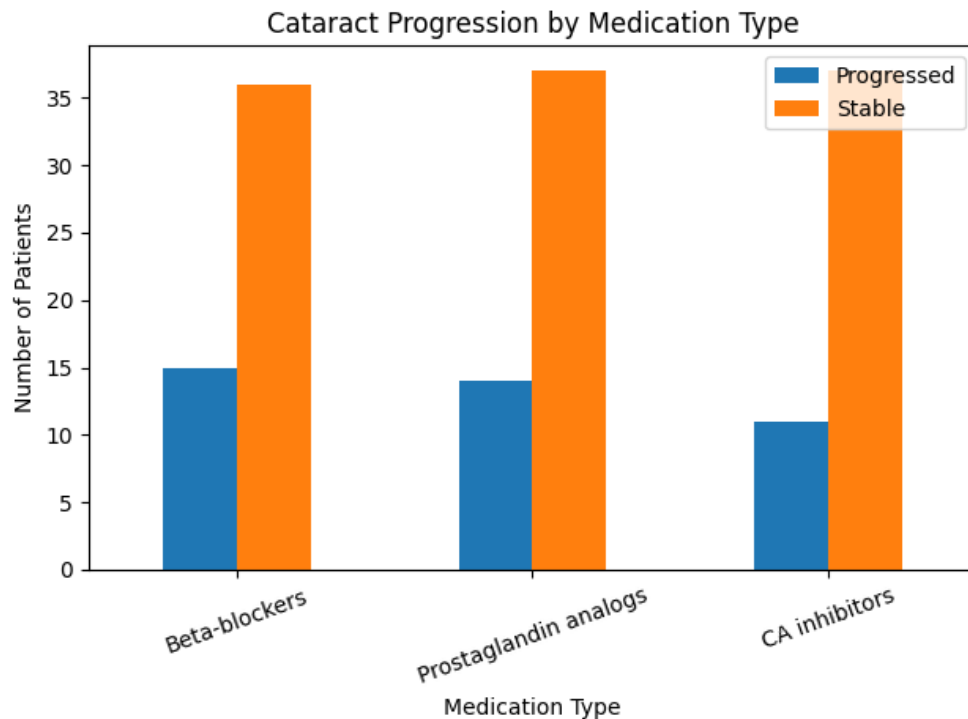


Figure 2: Cataract progression by medication type

### Discussion

This retrospective study assessed the safety of medical glaucoma treatment in patients with concurrent cataract, focusing on adverse drug reactions and cataract progression. The results demonstrate that adverse effects occurred in a significant proportion of patients (about 40%), aligning with the current literature on long-term topical anti-glaucoma treatment. The adverse effects are likely due to prolonged exposure to drugs and their preservatives, typically presenting as ocular surface irritation, conjunctival hyperaemia, and dry eye symptoms [4].

Beta-blockers and carbonic anhydrase inhibitors exhibited somewhat greater incidences of side effects relative to prostaglandin analogs. Nonetheless, these disparities were not statistically significant ( $p = 0.56$ ), indicating a generally comparable safety profile across the frequently utilized anti-glaucoma medications. This corresponds with prior research suggesting that although side effects are rather prevalent, they are typically modest and do not need cessation in the majority of instances [5].

This study discovered no statistically significant correlation between the kind of anti-glaucoma medicine and cataract advancement ( $p = 0.75$ ). This indicates that contemporary medicinal treatments for glaucoma do not markedly expedite lens opacification within the examined timeframe. While previous investigations have expressed

apprehensions over the possible influence of preservatives such as benzalkonium chloride on oxidative stress and lens transparency, the current findings do not indicate a clinically significant effect within a one-year period [6].

The lack of substantial correlations may be attributed to various variables. The progression of cataracts is a complex phenomenon impacted by age, systemic health issues, environmental factors, and genetic predisposition, potentially diminishing the efficacy of topical treatments. Moreover, variations in treatment length, drug combinations, and patient adherence may have impacted the results [7].

Although the safety profile is reassuring, the risk of cumulative ocular surface harm with extended treatment should not be disregarded. Clinicians must maintain vigilance, especially in patients undergoing prolonged treatment, and contemplate the utilization of preservative-free formulations when suitable. This study possesses specific limitations. The retrospective design may result in selection and information bias. The brief follow-up duration may be inadequate to identify nuanced or prolonged alterations in cataract progression. Moreover, the absence of uniform grading for cataract severity constrains the capacity to evaluate progression with greater precision. Future prospective studies with extended follow-up and objective lens grading systems are advised to corroborate these findings [8].

## Conclusion

This study suggests that pharmacological treatment for glaucoma in people with concurrent cataract is typically safe and well tolerated. A moderate percentage of patients encountered adverse effects; however, these were not significantly linked to any particular kind of anti-glaucoma medicine. No substantial correlation was identified between medical therapy and cataract progression during the study duration. The data indicate that frequently prescribed anti-glaucoma medications do not negatively affect lens opacity in the near run. Clinicians must exercise caution with prolonged use, especially due to possible ocular surface toxicity, and should contemplate personalized treatment approaches with consistent monitoring.

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