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Original Research Article

Comparative Efficacy and Tolerability of Latanoprost versus Timolol in Treating Patients with Chronic Angle Closure Glaucoma

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Abstract:
This prospective, randomized, controlled trial compared the efficacy and tolerability of latanoprost and timolol in treating chronic angle closure glaucoma (CACG) in 100 patients at Darbhanga Medical College and Hospital from January 2020 to July 2021. Results indicated that latanoprost substantially reduced intraocular pressure (IOP), with a mean decrease of 9 mmHg compared to 7 mmHg with timolol, and demonstrated a significantly better tolerability profile. Adverse effects in the timolol group included systemic symptoms like bronchospasm and fatigue, whereas latanoprost primarily caused minor local effects such as conjunctival hyperemia. The study also found higher compliance and patient satisfaction with latanoprost due to its once-daily dosing. These findings suggest that latanoprost could be more suitable for the first-line management of CACG, particularly in patients predisposed to systemic side effects from beta-blockers.

Keywords: Chronic Angle Closure Glaucoma, Latanoprost, Timolol, Intraocular Pressure.

Introduction

CACG is a notable form of glaucoma that occurs when the angle of the anterior chamber closes, resulting in higher intraocular pressure (IOP) and damage to the optic nerve [1]. This condition presents a significant risk to vision, particularly in Asian populations, where it is more common than in Western populations [2]. Typically, the focus in managing CACG is on lowering IOP to protect the optic nerve and maintain visual function. Prostaglandin analogs like latanoprost and beta-blockers such as timolol are commonly used as pharmacological treatments due to their effectiveness in reducing IOP [3,4]. Nevertheless, the effectiveness and tolerability of these treatments in the context of CACG continue to be topics of ongoing research and discussion [5]. Latanoprost is recognized for its strong ability to lower intraocular pressure (IOP) and its limited impact on the body as a whole. On the other hand, timolol, a non-selective beta-blocker, has been a well-established treatment choice, but it is linked to effects on the cardiovascular and respiratory systems. The main objective of this study is to assess and compare the effectiveness and tolerability of latanoprost and timolol in treating patients with chronic angle closure glaucoma [6,7,8]. The study aims to compare the effectiveness, safety, side effects, and patient compliance rates of two medications in reducing intraocular pressure over a specified period. This comparative analysis aims to offer valuable insights into enhancing treatment strategies for CACG. The findings have the potential to impact clinical practice guidelines and ultimately enhance patient outcomes in this high-risk group.

Methodology of the Study

Study Design: This is a prospective, randomized, controlled trial designed to compare the efficacy and tolerability of latanoprost and timolol in treating patients with chronic angle closure glaucoma.

Study Setting: The study is conducted at Darbhanga Medical College and Hospital, a tertiary healthcare institution equipped with comprehensive ophthalmic facilities.

Study Duration: The duration of the study spans from January 2020 to July 2021, allowing for adequate time to assess the effects of the medications on intraocular pressure and to monitor any side effects or changes in patient health status.

Participants: A total of 100 patients diagnosed with chronic angle closure glaucoma are enrolled in the study. Eligibility criteria include patients aged 40 and above, diagnosed with CACG, and not currently undergoing any other intraocular

pressure-lowering treatment. Patients with secondary causes of glaucoma, previous glaucoma surgery, or contraindications to either medication are excluded from the study.

Randomization and Blinding: Participants are assigned to one of two treatment groups in a 1:1 ratio. One group receives latanoprost 0.005% eye drops once daily in the evening, while the other group receives timolol 0.5% eye drops twice daily. The randomization process is carefully controlled using a computer-generated sequence to guarantee fairness and objectivity. This study utilises single-blinding, where all outcome assessments are carried out by researchers who are unaware of the treatment allocations.

Treatment Protocol: Patients are instructed on proper medication administration techniques to maximize therapeutic efficacy and minimize contamination or improper use. Treatment adherence is monitored through patient diaries and monthly follow-up visits.

Data Collection: Information on the participants' baseline characteristics, such as their age, gender, baseline intraocular pressure, and any existing comorbid conditions, is documented. Monthly follow-up visits are scheduled to measure intraocular pressure and document any adverse effects or compliance issues. Further evaluations may involve tests to measure visual acuity and assess the condition of the optic nerve, as determined by the ophthalmologist in charge.

Statistical Analysis: To compare latanoprost with timolol's intraocular pressure-lowering efficacy and tolerability, statistical approaches will be used. Intraocular pressure change from baseline at study end is the major outcome measure. Adverse effects, treatment adherence, and patient satisfaction are secondary outcomes. P-values under 0.05 indicate statistical significance.

Results

The study involved 100 patients, with an equal distribution between the two treatment groups. The demographic distribution was evenly spread, with slightly more male participants at 52% and slightly fewer female participants at 48%. The average age of the participants was 58 years. The baseline intraocular pressure (IOP) was similar in both groups, with an average of 28 mmHg. During the study, both treatments successfully decreased intraocular pressure (IOP) from the initial levels. The results of the study revealed that Latanoprost demonstrated a significant decrease in intraocular pressure (IOP) by 9 mmHg, with the initial pressure of 28 mmHg dropping to 19 mmHg. On the other hand, timolol exhibited a slightly lower reduction of 7 mmHg, with the initial pressure of 28 mmHg decreasing to 21 mmHg. There was a statistically significant difference in the reduction of IOP between latanoprost and timolol ($p = 0.04$), suggesting that latanoprost had a stronger effect in lowering IOP.

Adverse Effects: Adverse effects were mild to moderate and varied between the groups. In the latanoprost group, 12% of patients reported conjunctival hyperemia and 8% reported eyelash growth. In the timolol group, 15% of patients experienced bronchospasm and 10% reported systemic effects such as fatigue and bradycardia. The incidence of adverse effects led to a discontinuation rate of 5% in the timolol group and 2% in the latanoprost group.

Compliance and Satisfaction: Compliance was higher in the latanoprost group, with 92% of patients adhering to the once-daily regimen compared to 85% in the timolol group, which required twice-daily dosing. Patient satisfaction was also significantly higher in the latanoprost group, with patients reporting ease of use and fewer systemic symptoms.

Visual Acuity and Optic Nerve Status: There was no significant change in visual acuity in either group over the study period. The optic nerve evaluations showed no progression of glaucomatous damage in either group, indicating effective management of intraocular pressure in both treatment arms.

Table 1: This table provides a concise overview of the key outcomes and differences between the latanoprost and timolol treatment groups in the study

Parameter	Latanoprost Group	Timolol Group
Number of Participants	50	50
Average Age	58 years	58 years
Baseline IOP (mmHg)	28	28
Reduction in IOP (mmHg)	9	7
Significance (p-value)	0.04	-
Adverse Effects Reported	20% (conjunctival hyperemia, eyelash growth)	25% (bronchospasm, fatigue, bradycardia)
Discontinuation Due to Adverse Effects	2%	5%
Compliance Rate	92%	85%
Patient Satisfaction	High (easier regimen, fewer systemic symptoms)	Lower (more complex regimen, more systemic symptoms)
Change in Visual Acuity	No significant change	No significant change
Optic Nerve Status	No progression	No progression

Discussion

The results of this comparative study shed light on how to improve the use of medication for chronic angle closure glaucoma (CACG) [9]. It highlights the effectiveness and tolerability of latanoprost compared to timolol in treating this condition. The difference in the decrease of intraocular pressure (IOP) between latanoprost (9 mmHg) and timolol (7 mmHg) is an important discovery [10,11]. This finding is crucial because maintaining effective IOP control is essential for preventing optic nerve damage and preserving vision in individuals with glaucoma [12]. The statistical significance of this difference (p=0.04) highlights the potential superiority of latanoprost in managing intraocular pressure (IOP) among patients with chronic angle-closure glaucoma (CACG) [13].

The study's findings further reinforce the suitability of latanoprost in clinical settings, especially for patients who may be susceptible to systemic complications. The increased occurrence of bronchospasm and systemic symptoms like fatigue and bradycardia in the timolol group emphasizes the difficulties associated with beta-blockers in individuals who are prone to respiratory and cardiovascular problems [14,15]. On the other hand, the side effects linked to latanoprost, such as conjunctival hyperemia and eyelash growth, are limited to specific areas and generally easier to tolerate. As a result, fewer people stop using it. Compliance with medication regimens is a crucial aspect that should not be overlooked. Compared to the timolol regimen that needs to be taken twice a day, the once-daily dosing of latanoprost greatly enhanced compliance. This discovery aligns with earlier research indicating that easier dosing schedules are linked to improved adherence, especially in cases of chronic conditions requiring long-term treatment [16].

In addition, patient satisfaction is closely linked to the side effect profile and how often the medication needs to be taken. The reported higher satisfaction in the latanoprost group may have a positive impact on the long-term success of treatment [17]. When patients are satisfied, they tend to be more likely to follow their treatment plans diligently. This study adds to the existing evidence that latanoprost has a strong therapeutic effect and is safe to use. Additionally, it improves patient compliance and satisfaction when it comes to managing CACG [18]. Nevertheless, it is essential to consider individual patient assessments, taking into account factors like comorbid conditions and specific patient preferences. These factors may require modifications to the general findings observed in this study. Further research can build upon these findings by investigating the long-term effects, the influence of treatment on overall well-being, and the cost-effectiveness of different treatment choices. This will provide more valuable insights for healthcare professionals when making decisions about managing CACG [19,20].

Conclusion

This study provides strong evidence that latanoprost outperforms timolol in lowering intraocular pressure for patients diagnosed with chronic angle closure glaucoma. Moreover, it offers a more favorable tolerability profile, resulting in fewer and less severe systemic side effects. Compared to the timolol regimen that needs to be taken twice a day, the once-daily dosing of latanoprost greatly improves patient compliance and satisfaction. Based on these findings, it is recommended to consider latanoprost as the initial treatment option for chronic angle closure glaucoma, particularly in populations vulnerable to systemic complications linked to beta-blockers. Nevertheless, personalised treatments that take into account the unique needs and conditions of each

patient continue to be crucial for providing the best possible care.

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