

COMPARATIVE STUDY BETWEEN TIMOLOL AND TRAVOPROST FOR INTRAOCULAR PRESSURE REDUCTION IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA

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Abstract

Background: Increased intraocular pressure is a significant threat for the developing glaucoma. Early detection may reduce its progression by lowering intra ocular pressure. Prostaglandin analogue facilitate aqueous humor outflow and reduces intra ocular pressure effectively. The aim is to compare the intraocular pressure lowering efficacy of timolol and travoprost in patients with primary open angle glaucoma. **Materials and Methods:** This was a prospective, randomized, study including 100 subjects of newly diagnosed primary open-angle glaucoma. After baseline clinical evaluation, half the subjects were treated with timolol 0.5% eye drops; while the remaining half received travoprost 0.004% eye drops. The subjects were followed on subsequent visits to evaluate the efficacy of the two drugs. **Result:** Both the drugs reduced intra ocular pressure effectively. Travoprost 0.004% showed a significant reduction in the mean intra ocular pressure compared to timolol 0.5%. **Conclusion:** Both timolol 0.5% and travoprost 0.004% eye drops are effective in reducing intraocular pressure. However, travoprost was found to be statistically superior to timolol in lowering intra ocular pressure in patients with primary open angle glaucoma.

INTRODUCTION

Glaucoma is the leading cause of irreversible blindness worldwide, affecting over 60 million people and projected to increase to 80 million very soon. In 2013, the number of individuals aged 40 to 80 years with glaucoma was estimated to be 64.3 million, with projections of 111.8 million in 2040.^[1,2] In India, glaucoma is the third major cause of blindness after cataract and refractive errors, with an estimated 12 million cases and over 3 million people suffering from blindness due to the condition.^[3] Glaucoma is classified as either open angle or angle closure, with raised intraocular pressure being a strong risk factor. If left untreated, it can lead to permanent damage of the optic disc and visual field loss, progressing to blindness.^[4] However, early detection and medication can slow or arrest its development. Studies have shown that reducing intraocular pressure can reduce the rate of glaucomatous nerve or field damage, with an additional 1mm Hg of Intra Ocular Pressure (IOP) lowering reducing the risk of progression by

10%.^[5-7] Therapeutic measures, such as prostaglandin analogues and beta adrenergic antagonist, are the first line of management for primary open angle glaucoma. Timolol and travoprost are commonly used topical medications for reducing IOP, but few studies have compared their efficacy. Therefore, this study aims to compare the intraocular pressure lowering efficacy between timolol and travoprost in patients with primary open angle glaucoma.

MATERIALS AND METHODS

This prospective, unicentric, cross-sectional, descriptive study was conducted in the department of Ophthalmology and Department of Pharmacology, Nalanda Medical College and Hospital, Bihar. The study was approved by the institutional research and ethical committee. This study was conducted over a period of 12 Months from June 2021 to August 2022. An informed and written consent was obtained from all the

participating subjects prior to the commencement of the study.

The study included 100 subjects of newly diagnosed primary open angle glaucoma of either sex, aged above 40 years, and with intraocular pressure in the range of 22-32 mm Hg. The study subjects were divided equally into two groups based on systematic random sampling.

Group – I (n=50) - Timolol 0.5% eye drop twice daily, and

Group – II (n=50) - Travoprost 0.004% eye drop once a day.

Exclusion criteria for the study were acute angle closure glaucoma, pigmentary glaucoma, exfoliation glaucoma, secondary glaucoma, pregnant and lactating females, bronchial asthma/chronic obstructive pulmonary disease, second/third degree heart block, any ocular infection in the last 3 months, history of allergy to study drugs, and those with a history of severe renal disease. The primary efficacy parameter was intraocular pressure measured at 11 am at baseline and each follow-up visit, and the primary safety parameter was adverse effects noticed at each follow-up visit. A thorough evaluation of all study subjects was done by detailed history taking followed by general, systemic, and ocular examination at the baseline visit. The baseline characteristics of all study subjects of both groups were similar. The diagnosis of primary open angle glaucoma was made by an ophthalmologist based on detailed ocular examination. IOP was measured using Goldman applanation tonometer. Follow-up was done at the end of the 1st week, 2nd week, 3rd week, and 4th week. During each follow-up visit, ocular examination and IOP measurement were done, and they were assessed for any adverse effects. Visual acuity and visual field were assessed at day 0 and at the end of the study period, i.e., at week 4. Subjects of one group were instructed to instill one drop of timolol 0.5% eye drop in the affected eye twice daily. Subjects of the other group were instructed to instill one drop of travoprost 0.004% eye drop once daily in the evening. They

were advised to lie down or with head tilted back, to form a conjunctival pouch, and to instill the drug without the dropper touching the eye area and then close the eye gently without blinking, rubbing, or squeezing. They were then instructed to apply pressure over the lacrimal puncta for one minute.

RESULTS

For the current study, we recruited a total of hundred cases of primary open angle glaucoma and divided them equally into two groups. We ensured that there was no loss to follow up of study subjects throughout the study period by making reminder telephonic calls to subjects one day before follow up day and even if they missed any follow up visit on the same day, we asked them to come on the next day. Our study revealed the following results.

The majority of study subjects from both groups were from the age group 45-60 years, with a mean age of 58.12 ± 8.40 in both groups.

We found that the majority of study subjects were male in both groups, with a male to female ratio of 2:1. [Figure 1]

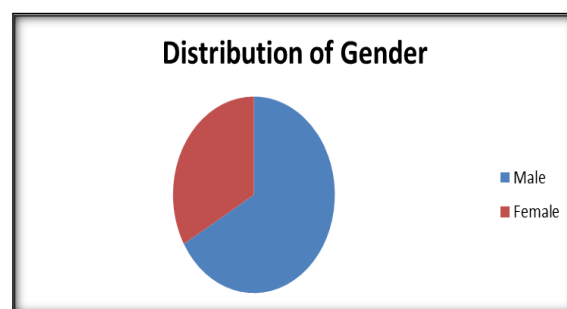


Figure 1: Distribution of Gender

At baseline, mean IOP was clinically comparable in both groups, with a significant reduction in mean IOP from baseline to week 4 in both the Group I and Group II. Travoprost reduced IOP more effectively compared to Timolol. [Table 1]

Table 1: Change in mean IOP in both groups (n = 30)

Study groups	Baseline IOP	Week 4 IOP	p- value
Group - I	25.06 ± 2.80	19.02 ± 2.13	<0.0001#
Group - II	24.17 ± .63	17.15 ± 2.34	<0.0001#

Our study also showed that there was a significant reduction in mean IOP of study subjects in the Group II as compared to the Group I at week 1, week 2, week 3, and week 4.

Table 2: Mean intra ocular pressure in both the groups

	Mean IOP ± S.D.				
	Baseline IOP	1st Week	2nd Week	3rd Week	4th Week
Group I	25.06 ± 2.80	21.93±2.21	20.77±3.16	19.64±3.21	19.02± 2.13
Group II	24.17 ± .63	20.43±2.06	18.33±3.17	17.45±3.15	17.15± 2.34
p-value	0.6	0.04	0.01	0.01	0.01

In our study, the majority of study subjects did not develop any adverse effects, and adverse effects were only ocular, with no systemic adverse effects seen in any of the study groups. The most common adverse effect noticed was ocular hyperemia in both groups. [Table 3]

Table 3: Adverse effects in study subjects of both the groups

Adverse effects	Group I	Group II
Conjunctival hyperaemia	3	5
Discomfort	4	2
Pain	2	0
Foreign body sensation	0	2

DISCUSSION

This prospective study was done to compare and evaluate efficacy of timolol 0.5% eye drops and travoprost 0.004% eye drops in management of patients of primary open angle glaucoma. The outcomes of the study are discussed as follows.

In this study the overall mean age of the study subjects was 58.12 ± 8.40 years, mean age of study subjects in Group I was 59.13 ± 8.61 years and that in Group II was 57.35 ± 8.01 years. The difference in mean age of study subjects was not significant. The age distribution of the study subjects in our study groups were consistent with the previous study reports of Mehani R et al, Khan F et al and Babić N et al.^[8-10] However the age distribution of the study subjects in the study reports of Jeffrey A et al and Giuffre I et al was comparatively higher.^[11,12]

Our study findings also observed a predominance of males for the disease of interest of the study male. This study reports of Mehani R et al, Khan F et al and Parrish RK et al also reported a lower prevalence of females in their study.^[7,9,13]

An increased intra ocular pressure remained the major threat factor for development primary open angle glaucoma. It is established through randomized controlled trials that reducing IOP may reduce the rate of glaucomatous nerve or field damage.^[5-6]

In the current study, Group I showed a significant reduction in intra ocular pressure from baseline to 4th week. These findings were similar to the previous study findings of Goldberg I et al, Netland PA et al and Fellman RL et al, who also reported a similar reduction of intra ocular pressure.^[14,15] The present study reports also showed a significant reduction in intra ocular pressure from baseline to 4th week Group II. These observations were in consonance with the study findings of Mehani R et al, Goldberg I et al, Netland PA et al, Cheng JW et al, and Deepankar UP et al.^[7,14-18] Group II showed a comparatively higher and effective reduction of intra ocular pressure compared to Group I at each subsequent follow up visit.

Our study also recorded the adverse effect of drugs occurred during the study. Conjunctival hyperemia remained the most common ocular problem in both the groups. Hyperemia was observed more commonly in Group II compared to Group I. The other adverse effects were ocular discomfort, pain and foreign body sensation. In contrast, Goldberg I et al and Mehani et al reported higher incidence of hyperemia with timolol compared to travoprost.^[14,19]

CONCLUSION

Both timolol 0.5% and travoprost 0.004% eye drops are effective in reducing intraocular pressure. However, travoprost was found to be statistically superior to timolol in lowering intra ocular pressure in patients with primary open angle glaucoma.

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