Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/qffnwd79

TO STUDY THE EFFECTS OF 0.5% TOPICAL TIMOLOL ON HEART RATE AND BLOOD PRESSURE IN PATIENTS SUFFERING FROM OPEN ANGLE GLAUCOMA-- A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: This study was done for evaluation of effects of 0.5% topically used timolol maleate eye drop on heart rate & systemic blood pressure as pre-treatment and after- treatment in patients who were suffering from primary open angle glaucoma.

Methods: Total 60 patients were randomly selected and equally divided into group I (n=30) and group II (n=30). Group I – IOP between 20 to 30 mm Hg at Schiotz. Group II – IOP between 31 to 40 mm Hg at Schiotz. Each group was further divided into two subgroups, IB and IIB. Subgroup IB and IIB included those on timolol maleate (0.5% topical) administered one drop twice daily for 24 weeks. All 60 patients were evaluated for heart rate and blood pressure examination at the interval of 2^{nd}, 4^{th}, 6^{th}, 8^{th}, 10^{th}, 12^{th}, 14^{th}, 16^{th}, 18^{th}, 20^{th} and 24^{th} weeks. Adverse effects of the drug during study period were also noted. Mean $^{+}$- SD, t value, p value were analysed by graph pad software.

Results: A mean pre-treatment heart rate was 78.17 $\pm$ 3.12 beats / min and after at the end of 24 weeks of treatment there was a mean reduction of 4.0 $\pm$ 2.26 beats/min when 0.5% topical timolol maleate eye drop was induced. A mean pre-treatment systolic and diastolic blood pressure were 131.0$\pm$10.69 mm Hg and 85.86$\pm$5.69 mm Hg respectively. There was a fall of 5.0 $\pm$ 3.48 mm Hg of systolic blood pressure and 3.29$\pm$2.78 mm Hg of diastolic blood pressure at the end of 24 weeks after treatment with 0.5 % topically induced timolol maleate eye drop.

Conclusion: After this study it is concluded that 0.5% topically induced timolol maleate eye drop lowers systemic blood pressure as well as heart rate also.

Keywords: Systolic Blood Pressure, 0.5% Topical Timolol Maleate, Primary Open Angle Glaucoma, mm Hg at Schiotz, Diastolic Blood Pressure.

INTRODUCTION

Glaucoma is a group of eye diseases that lead to damage of the optic nerve, which transmits visual information from the eye to the brain. Glaucoma may cause vision loss if left untreated. The major risk factor for glaucoma is increased intraocular pressure which normal range is from 10mm of Hg at Schiotz to 21mm of Hg at Schiotz. There are different types of glaucoma, but the most common are called open-angle glaucoma and closed-angle glaucoma. Inside the eye, a liquid called aqueous humor helps to maintain shape and provides nutrients. The aqueous humor normally drains through the trabecular meshwork. In open-angle glaucoma, the draining is impeded, causing the liquid to accumulate and pressure inside the eye to increase. This elevated pressure can damage the optic nerve. Treatment typically includes prescription of eye drops, medication, laser treatment or surgery.[1] The goal of these treatments is to decrease eye pressure.[2] Worldwide, glaucoma is the second-leading cause of blindness after cataracts, and is the leading cause of irreversible blindness worldwide.[3]

MATERIAL AND METHODS

Selection of cases

A total of 60 cases of primary open angle glaucoma were selected from those attending the out patient department of ophthalmology and glaucoma patients admitted in the ward of MGM Medical College & Hospital, Jamshedpur. This study is carried out from 1st march 2013 to 1st march 2014 total one year.

The selected patients were divided into three groups according to their intra-ocular pressure-

Group I – IOP between 20 to 30 mm Hg at Schiotz.

Group II – IOP between 31 to 40 mm Hg at Schiotz.

Group III – IOP above 40 mm Hg at Schiotz.

Group I had a total of 30 patients. Group II also had a total of 30 patients and there was no patients in Group III.

Each group was further divided into subgroup B

Subgroup B included those on Timolol maleate eye drop (0.5%)

The selected patients were finally categorised into -

Group I (B)

- Patients of Group I(B) were administered Timolol maleate eye drop (0.5%) , one drop twice daily.

Group II (B)

- Patients of Group II (B) were administered Timolol maleate eye drop (0.5) one drop twice daily.

Group III (B)

There were no patients in this group.

Exclusion Criteria

1. The patients who had intraocular surgery.
2. Those who were suffering from bronchial asthma,COPD, excluded from this study.
3. Patients suffering from Angle closure glaucoma.
4. Patients suffering from any other ocular disease like cataract, uveitis, conjunctivitis, keratitis, corneal ulcer etc.
5. Patients below 35 years of age.

Inclusion Criteria

1. Patients suffering only from primary open angle glaucoma.
2. Patients above 35 years of age and both male and female.

The patients were instructed not to administer their eye-drops on the morning of the check-up visits (week 2, week 3, week 4, week 6, week 8, week 10, week 12, week 16, week 20 and week 24) in order to measure drug efficacy 12 hours after the previous evening dose.

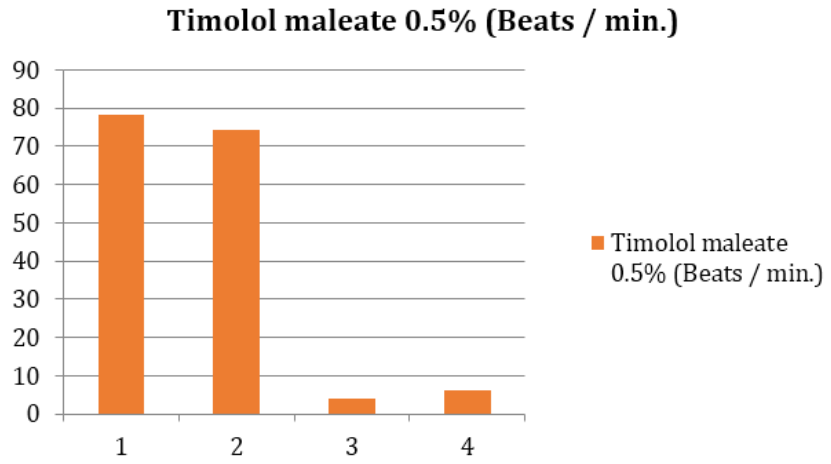
During each visit, patients were examined as follows

a) General examination – includes pulse rate, heart rate and blood pressure.
b) Ocular examination – includes external examination, slit-lamp examination, Schiotz tonometry, fundus examination and field analysis by Octopus auto-field analyzer.
c) Any complaint regarding adverse effects of the drug during study period was noted.

Statistical Analysis

Statistical analysis of data obtained were presented in tabular form. Mean $^{+}$- SD, t value, p value were done by graph pad software, p value less than 0.05 was considered significant.

RESULTS

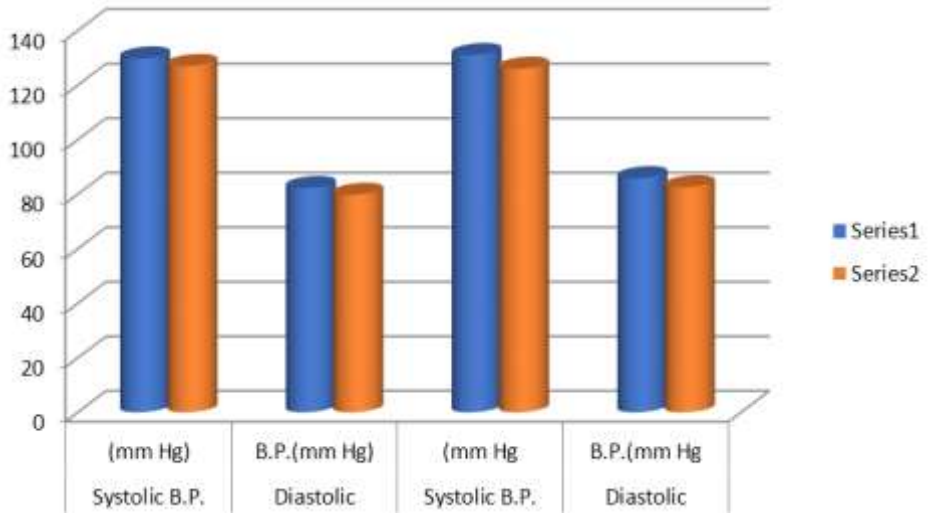


Graph 1: Effect of Timolol Maleate on Heart Rate (Mean ±SD)

	Timolol Maleate 0.5% (Beats / min.)
Pre-treatment	78.17 ± 3.12
End of week 24	74.17 ± 3.66
Difference	4.0 ± 2.26
t- value	6.14
p- value	<0.001

Table 1: Effect of Timolol Maleate on Heart Rate (Mean ±SD)

Table-1 shows a mean pre-treatment heart rate of 78.17 ± 3.12 beats / min. in Timolol group. At the end of 24 weeks of treatment there was a mean reduction of 4.0 ± 2.26 beats / min. in Timolol group.



Graph 2: Effect of Timolol Malate (0.5%) on Blood Pressure (Mean ±SD)

	Timolol Maleate (0.5%)	
	Systolic B.P. (mm Hg)	**Diastolic B.P.(mm Hg)**
Pre-treatment	131.0±10.69	85.86±5.69
End of week 24	126.0±10.05	82.57±5.05
Difference	5.0±3.48	3.29±2.78
t- value	5.37	4.42
p- value	<0.001	<0.001

Table 2: Effect of Timolol Malate (0.5%) on Blood Pressure (Mean ±SD)

Table-2 shows a mean pre-treatment systolic blood pressure of 131.0 ± 10.69 mm Hg and pre-treatment diastolic blood pressure of 85.86 ± 5.69 mm Hg in timolol group.
There was a fall of 5.0 ± 3.48 mm Hg of systolic blood pressure and a fall of 3.29 ± 2.78 mm Hg of diastolic blood pressure in timolol group at the end of week 24.

DISCUSSION

Timely and adequate control of glaucoma is very important to prevent further silent loss of vision. The treatment of glaucoma is primarily directed towards lowering intra ocular pressure. This can be brought about by conservative medical treatment, laser therapy or by surgery. Initially, patients with glaucoma are treated with ocular hypotensive agents. If IOP is not sufficiently lowered or the disease progresses, as estimated by decay of visual fields or increasing excavation of the optic disc then Argon laser trabeculoplasty or surgical filtering procedure, trabeculectomy may be performed. As noted by Schuman J.S. et al, significant effect ($p < 0.001$) on mean changes from baseline heart rate was noted in the present study with Timolol.[4] At the end of 24 weeks of treatment there was a mean reduction of 4.0 ± 2.26 beats/min. in Timolol group respectively.
In present study, there was fall in both systolic and diastolic blood pressure the group treated with Timolol and were clinically significant. Timolol is a non-selective beta blocker medication used either by mouth or as eye drops. As eye drops it is used to treat increased pressure inside the eye such as in ocular hypertension and glaucoma. By mouth it is used for high blood pressure, chest pain due to insufficient blood flow to the heart, to prevent further complications after a heart attack, and to prevent migraines. Common side effects with the drops is irritation of the eye. Use is not recommended in those with asthma, uncompensated heart failure, or COPD. Timolol was patented in 1968, and came into medical use in 1978.[5] It can also be used in combination with pilocarpine & carbonic anhydrase inhibitors.[6] Ellen Strahman et al, reported in 1995, the most frequently reported symptom among patients receiving timolol was bitter taste (7%).[7]

CONCLUSION

After this study it is concluded that 0.5% topically induced timolol maleate eye drop lowers systemic blood pressure as well as heart rate also in patients suffering from primary open angle glaucoma.

AUTHOR CONTRIBUTION LIST

1. Dr. Akash Chandra contributed to the process of conceptualisation and review.
2. The statistical work was completed by Dr. Sanjeet Kumar.
3. Dr. (Prof.) Gajendra Kumar contributed to the proper review and editing of this article.
4. Dr. Bina Kumari contributed to the entire article drafting from the original thesis.

Funding

None

Conflict of Interest

None

Approval from IEC

This study has been approved from Institute Ethics Committee at MGM Medical College, Jamshedpur, Jharkhand.

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