

Effect of 5% phenylephrine eye drops on blood pressure

Mohammed Ather^{1,*}, Rahmathunissa², Saudhamini Siguru³, Wajhia Sultana⁴

¹Professor, ²Assistant Professor, ³Junior Resident, ⁴Internee, Dept. of Ophthalmology, Gandhi Medical College Secunderabad
Telangana

***Corresponding Author:**

Email: ather11258@gmail.com

Abstract

Aim: To study effect of 5% phenylephrine eye drops on Blood Pressure.

Materials and Methods: This is prospective randomly controlled study conducted at the department of Ophthalmology of Gandhi Hospital during January 2015 to December 2015. 50 patients between 30-70 years of age who came for eye check up to Gandhi Hospital were included in study. Informed consent was obtained from all patients. The patients who had Secondary Hypertension because of systemic disease like chronic renal failure, Pregnancy induced hypertension and other diseases were excluded from the study. Off 50 patients 25 had Primary Hypertension and came for eye check up with various complaints. 25 patients with matching age group of 30-70 years who were non Hypertensives were included as controls in the study. Blood pressure was recorded in all 50 patients as base line. Then one drop of 1% Tropicamide and 5% Phenylephrine eye drop combination was instilled into lower fornix of all patients after recording BP and every 15 minutes up to 30 minutes. The BP was recorded after 30 minutes again.

Results: Rise in both Systolic and Diastolic pressure was observed in Group 1 i.e.: Hypertensives. Whereas in group 2 non hypertensives only rise in Systolic pressure was observed.

Conclusion: 5% Phenylephrine causes rise in both systolic and diastolic pressures in Hypertensive group. The rise was 20-40 mmHg in systolic and 10-20mmHg in diastolic pressure. The rise was significant in patients who were aged between 60-70 years irrespective of their sex. So it has to be used with caution in elderly hypertensives.

Keywords: Diastolic Pressure, Hypertensives, Phenylephrine, Systolic pressure.

Introduction

The patients who visit Ophthalmology OP of any hospital are mostly belongs to 50 years plus age group. Most of them will have cataract in different stages of development.⁽¹⁾ Nearly 40% of them will have Primary hypertension.⁽²⁾ Phenylephrine 5% in combination with Tropicamide will be used to dilate the pupil for diagnostic fundus examination or for cataract surgery.⁽³⁾ Phenylephrine is known to cause rise in Systolic and diastolic blood pressure by its selective alpha 1 adrenergic receptors agonist activity.⁽⁴⁾ In the literature available, various studies had been done using 10% Phenylephrine eye drops on the rise of blood pressure in Hypertensives and normal individuals. The need for this study is to compare effect of 5% Phenylephrine on both Hypertensives and non-Hypertensives of matching age groups.

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of systemic disease like chronic renal failure, Pregnancy induced hypertension and other diseases were excluded from the study. Off 50 patients 25 had Primary Hypertension and came for eye check up with various complaints. 25 patients with matching age group of 30-70 years who were non Hypertensives were included as controls in the study. Blood pressure was recorded in all 50 patients as base line by mercury Sphygmomanometer. Then one drop of 1% Tropicamide and 5% Phenylephrine eye drop combination was instilled into lower fornix of all patients every 15 minutes up to 30 minutes. The BP was recorded after 30 minutes again after three instillation of eye drops.

Results

A rise of both systolic and diastolic BP was observed, in hypertensives, after 30 min.

- Rise in systolic BP was between 20-40 mm of Hg and diastolic BP between 10-20 mm of Hg in hypertensives.
- In controls a rise of systolic BP was between 10-20 mmHg and there was no rise in diastolic blood pressure.



Fig. 1

Discussion

Phenylephrine HCL is a direct acting synthetic sympathomimetic amine. It acts on the alpha 1-adrenergic receptors resulting in peripheral vasoconstriction causing a rise in both the systolic and diastolic blood pressure when given parenterally. In ophthalmology this topical sympathomimetic amine is used as a vasoconstrictor and a mydriatic.

A significant amount of topically instilled phenylephrine can be absorbed into the circulation via the conjunctival and episcleral vessels and from nasal and oral mucosa into systemic circulation.⁽⁵⁾

Plasma drug level from mucosal absorption can rise as rapidly as intravenous administration as evidenced by reports of marked increase in blood pressure, tachycardia, arrhythmia occurring in patients given topical administration of phenylephrine.⁽⁶⁾

The period of maximal systolic blood pressure rise is around 10-20 minutes after the administration of phenylephrine which corresponds to the time of maximal plasma phenylephrine level.⁽⁶⁾

There was rise in systolic blood pressure of 20-40 mm of Hg in Hypertensive group. 11 patients had rise in systolic BP up to 10 mm of Hg. 11 patients had rise in systolic BP up to 20 mm of Hg. 2 patients had rise up to 30 mm of Hg. 1 patient had rise in systolic BP up to 40 mm of Hg. Mean rise in systolic BP in Hypertensive patients was 17.2 mm of Hg with Standard deviation of 7.91622.

There was rise in diastolic BP of 10-20 mm of Hg in Hypertensive group. 5 patients didn't had any rise in diastolic BP. 15 patients had rise in diastolic BP up to 10 mm of Hg. 5 patients had rise in diastolic BP up to 20 mm of Hg. Mean rise in diastolic BP was 8.4 mm of Hg with Standard deviation of 5.5377. Rise in both

systolic and diastolic BP in Hypertensive patients was directly proportionate to chronological age of the patient.

Among the control group there was rise in systolic BP up to 10- 20 mm of Hg. 5 patients did not have any rise in BP. 17 patients in control group had rise in systolic BP up to 10 mm of Hg. 3 patients in control group had rise in systolic BP up to 20 mm of Hg. Mean rise in systolic BP in control group was up to 9.2 mm of Hg with Standard deviation of 5.71547. Only 1 patient in control group had rise in diastolic BP up to 10 mm of Hg.

Risk of rise in systolic BP in Hypertensive patients was 100% and the risk of rise in systolic BP in non-Hypertensive patients was 80% with overall risk of 90% and P value of 0.0257 which is significant.

Risk of rise in diastolic BP in Hypertensive group was 76% and the risk of rise of diastolic BP in non-hypertensive group was 4% with overall risk of 40% and P value of 0.0028 which is significant.

N B Kenawy et al⁽⁷⁾ who used 10% Phenylephrine eye drops, 10 patients in the normotensive group showed a mean rise in systolic BP of 34.4 mm Hg and 10.5 mm Hg in diastolic BP. In the hypertensive group six patients recorded a rise in systolic BP with a mean of 22.8 mm Hg and a diastolic rise with a mean of 16.8 mm Hg.

Chin KW et al⁽⁸⁾ have reported significant increase in blood pressure after instillation of one drop of 10% phenylephrine pre-operatively. Blood pressure readings were found to be raised in hypertensive and non-hypertensive patients receiving phenylephrine at the start of the operation and at five, 10, 15 and 20 minutes intra-operatively and the first three hours post-operatively. 10.3% of the 10% phenylephrine group required intra operative intravenous anti-hypertensive agent to control the blood pressure.

Samantaray and Thomas et al⁽⁹⁾ also reported a definite increase in blood pressure after topical use of phenylephrine in 30 hypertensive and 30 normotensive cases. Systolic and diastolic blood pressure rose by about 10 to 40 mmHg and 10 to 30mmHg respectively in all the cases.

Table 1

Studies	Hypertensive group			Non Hypertensive group		
	No. of patients	Rise in SBP	Rise in DBP	No. of patients	Rise in SBP	Rise in DBP
N B Kenawy et al	6	22.8mm Hg	16.8mmHg	10	34.4mmHg	10.5mmHg
Samantary and Thomas	30	10-40mmHg	10-30mmHg	30	10-40mmHg	10-30mmHg
Present Study	25	17.2mmHg	8.4mmHg	25	9.2mmHg	No significant rise

Conclusion

5%phenylephrine should be used with caution in elderly hypertensive patients as it causes rise in both systolic and diastolic blood pressure.

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