



COMPARATIVE STUDY OF DORZOLAMIDE AND LATANOPROST ON INTRAOCULAR PRESSURE REDUCTION ON RABBIT'S EYE

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ABSTRACT

Anti glaucoma agents are used for reduction of intraocular pressure. The present work was carried out to compare effect of dorzolamide and latanoprost on intraocular pressure of rabbit's eye. The study was carried out for the production of glaucoma by water loading method on rabbit's model. In present work done by me, Anti glaucoma effect of drugs namely dorzolamide and latanoprost was compared with control and with each other. Analysis of variance and student's t-test were applied to compare the result. It was found that intraocular pressure varied significantly across the three groups ($p = .000$). Compared to control group, intraocular pressure was significantly less in both latanoprost and dorzolamide groups ($p = .000$). Reduction of intraocular pressure with dorzolamide was less in comparison to that of latanoprost ($p = .018$) at the end of work. Latanoprost is more efficacious than dorzolamide as far as intraocular pressure reduction is concerned.

Keywords: dorzolamide, latanoprost, anti-glaucoma effect, rabbits, water loading method.

INTRODUCTION

Glaucoma is a slowly progressive insidious optic neuropathy that usually is associated with chronic elevation of intraocular pressure¹. The rise in intra ocular pressure is due to the increase in aqueous formation low rate of outflow or a raised pressure in the episcleral veins. Retinal ganglion cell death is initiated when some pathologic event blocks the transport of growth factor from the brain to the retinal ganglion cell. These neurotrophins initiate a damage cascade and the cell is unable to maintain normal functions². Patient risks for glaucoma are those with affected first degree relative diabetics and myopes should be examined after the age of 40 years³. The glaucoma is seen in two principal clinical forms (a) Open angle (b) Angle closure. Factors modifying intraocular pressure are 1) physiological variation b) local mechanical factors and c) pharmacological factors⁴. The normal intra ocular pressure of an individual ranges from 10-20 mmHg and can rise up to 60 mmHg in glaucoma patients. The management aspect includes lowering of intra ocular pressure by reducing secretion of aqueous humor or by promoting its drainage. Five general groups of drugs-cholinomimetics, alpha agonists, beta-blocker, prostaglandin F2 alpha analogue and diuretics-have been found to be useful in reducing intraocular pressure⁵. The latanoprost works by increasing uveoscleral outflow of aqueous. It can be used in normal pressure glaucoma also where as dorzolamide acts by decreasing aqueous secretion⁶.

MATERIALS AND METHODS

Healthy rabbits (1.5 - 2) Kg of either sex were grouped in control, dorzolamide, latanoprost group for inducing the rise in intraocular pressure. All the experiments were approved by the Institutional animal ethics committee, ethical committee of Katihar medical college and hospital Katihar Bihar, India for conducting animal experiments. For Study of Raising Intra Ocular pressure, water loaded rabbit's model of glaucoma as per method of Sugiyama *et. al.* was used. Also for anti- Glaucoma effect, Sugiyama *et. al* method was

adopted. Drug used: a) dorzolamide 1 % b) Latanoprost (i) .0025 %. Study of anti-glucoma effect this was studied on the basis of sugiyama *et.al* method. Glaucoma was produce by water loading method. Rabbits of either sex with body weight between (1.5-2) kg were taken. They were kept on overnight fasting and on the day of experiment were anaesthetized using Sodium Pentobarbitone in the dose of 30 mg/kg body weight, 45 minutes before the experiment. 10 minutes before the water loading of the animal the anaesthesia maintenance dose of 4 mg/kg body weight Sodium Pentobarbitone was administered via marginal ear vein. Base line intra ocular pressure was measured under corneal anaesthesia by instilling 2 drops of Xylocaine (4 %), three times at 2 minutes interval. Tap water 100 ml/kg body weight was administered orally through an intragastric infant feeding tube within 30 Second. The intra ocular pressure was measured at baseline, 30 and 60 minutes after the water loading till the intra ocular pressure reached the baseline value by that time. For evaluating anti glaucoma activity of an agent it was administered in the form of eye drops to one of the eyes of the water loaded animal, while the distil water was instilled in the Contra lateral eye (Control). The difference in intraocular pressure was observed in the two eyes at various time intervals⁷.

Statistical analysis

Data were presented in mean \pm SEM. and were analysed using statistical package for social scientists 10 (SPSS). Student's t-tests and ANOVA were applied to compare significance between different groups ($p < 0.05$)⁸.

RESULTS AND DISCUSSION

Intraocular pressure with control, latanoprost and dorzolamide were ($19.6 \pm .60$), ($13.0 \pm .56$) and ($14.88 \pm .44$) respectively, one hour after drug administration. The mean intraocular pressure in three groups varied significantly [$F(2, 27) = 140.056$ $p = .000$]. The mean intraocular pressure of latanoprost group was significantly less than control group [$t(18) = 8.05$ $p = .000$].

Table 1: Effect on Intraocular Pressure after Instillation of Different Drugs on Day 5

No. of rabbits in each group	Post fasting average body weight in (Kg)	Drugs Used	IOP before drug administration	IOP 1/2 Hr. After Drug administration	IOP 1 Hr. After Drug administration
10	1.5 Kg	Control (Distil water)	(24.8 ± .82)	(22.2 ± .62)	(19.6 ± .60)
10	1.65 Kg	Latanoprost (.0025%)	(24.4 ± .74)	(15.46 ± .67) t value = 7.43 p=.000	(13.0 ± .56) t value = 8.05 p=.000
10	1.55 Kg	Dorzolamide (1%)	(24.32 ± .11)	(17.36 ± .08) t value = 7.74 p=.000	(14.88 ± .44) t value = 6.34 p=.000

I.O.P-Intraocular pressure, p < .05 significant

It was also significantly less in the dorzolamide group in comparison to control group [t(18) = 6.34 p = .000]. However, the mean intraocular pressure in latanoprost was found to be significantly less in comparison to dorzolamide group [t (18) = 2.64 p = .016]. Similarly at half an hour during experiment intraocular pressure with control, latanoprost and dorzolamide were (22.2 ± .62), (15.46 ± .67) and (17.36 ± .08). The mean intraocular pressure in three groups varied significantly [F (2, 27) = 43.578 p = .000]. The mean intraocular pressure of latanoprost group was significantly less than control group [t(18) = 7.43 p = .000]. It was also significantly less in the dorzolamide group in comparison to control group [t(18) = 7.74 p = .000]. Also mean intraocular pressure in latanoprost was found to be significantly less in comparison to dorzolamide group [t (18) = 2.818 p = .011]. Niazi MK *et al.* in year 2004 did work on intraocular pressure reduction. After three months latanoprost reduce mean baseline intraocular pressure from 27.2 ± 3 mmHg by 8.5 ± 3.3 mmHg. The similar figures for dorzolamide were 27.3 ± 3.4 and 5.6 ± 2.6. The difference of 2.9 mm Hg (95 % CI: 2.3-3.6) was highly significant p < .001. It was evident that latanoprost was superior to dorzolamide judged from the effect on mean intraocular pressure⁹.

CONCLUSION

From above observations it is evident that latanoprost is more efficacious than dorzolamide as far as intraocular pressure is concerned.

Ethical Considerations

Ethical issues (including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double

publication and/or submission, redundancy, etc) have been completely observed by the authors. Ethical clearance in the context of animal experimentation to conduct the study was obtained from the ethical committee of Katihar medical college and hospital, Katihar, Bihar, India.

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