Effects of topical timolol and latanoprost on ocular perfusion pressure in ocular hypertensive volunteers

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Purpose

A prospective, open-label, clinical trial (NCT04412096) with randomized crossover treatments was used to test the hypothesis that latanoprost 0.005% or timolol 0.5% had differing effects on ocular perfusion pressure (OPP) in subjects with elevated intraocular pressure (IOP).

Methods

Ninety-three qualifying eyes from volunteers with ocular hypertension with or without glaucoma (n=46, ages 39 to 79 years) were included in the study. Data were compiled at The Ohio State University, Mayo Clinic, and University of Nebraska Medical Center. Intraocular pressure by pneumatonometry, systolic and diastolic blood pressures (SBP and DBP, respectively) by sphygmomanometry, were measured at baseline and after one week treatment with timolol 0.5% or latanoprost 0.005%. The treatment order was randomized and a 6-week washout period was scheduled between treatments. Mean ocular perfusion pressure (MOPP) was calculated using IOP, SBP and DBP. JMP® Pro 16 (SAS Institute Inc., Cary NC, 1989-2024) was used for data analysis. Two-sided paired t-tests were applied for subject-level comparisons and linear mixed models were used when accounting for correlation between eyes within individuals. Significance was set at $P<0.05$.

Results

IOP decreased similarly with both treatments ($p<0.0001$). Latanoprost reduced DBP ($p=0.01$), had no change in systolic blood pressure (SBP), diastolic ocular perfusion pressure (DOPP), or systolic ocular perfusion pressure (SOPP), but increased MOPP ($p=0.0003$). Timolol reduced DBP ($p=0.01$) and SBP ($p=0.01$), had no change in SOPP or DOPP, but increased MOPP ($p=0.006$) as well. Latanoprost increased MOPP more than timolol due to a lesser effect on SBP.

Conclusions

In our study of OHTS and open-angle glaucoma, both latanoprost and timolol increased MOPP and decreased IOP. Timolol's increase on MOPP is less than latanoprost due to its decrease of SBP. This study differs from our previous study of ocular normotensive subjects in that latanoprost did not affect DBP.