Purpose: Glaucoma is an intracocular pressure (IOP)-related optic neuropathy. Topical beta-blockers lower IOP by decreasing aqueous humor flow. However, patients vary in their response to this drug class. This study was designed to obtain pilot data on variations in aqueous humor flow response to topical timolol.

Methods: Subjects were enrolled in an IRBMED approved prospective, randomized fluorophotometry study. After instilling topical fluorescein in each eye, one eye was randomized to timolol 0.5% and the other eye to placebo. Aqueous humor flow was then calculated from scans of each eye performed hourly between 8 AM and noon. The flow rates were compared using paired Student’s t-test with p-value <0.05 determined to be statistically significant. The ordinary least squares regression test was used to model the relationship between aqueous flow values in placebo-treated and timolol-treated eyes.

Results: We obtained data on 30 subjects (17 men, 13 women) with an average age of 35.2 ± 13.5 years. Inpatient setting was utilized to study 8 subjects and remaining 22 subjects were studied in outpatient clinic setting. The aqueous flow of placebo-treated eyes had significantly lower flow of 1.73 ± 0.71 µL/min (p<0.0001). The percent decrease in flow ranged from 6% to 68%. Comparison of aqueous humor flow in the placebo eye and difference in flow between placebo- and timolol-treated eyes yielded r² of 0.45.

Conclusions: As expected, timolol decreased aqueous humor flow, but there was variation in aqueous flow response. From our sample size, we found that individuals with higher aqueous flow demonstrated greater response to timolol compared to those with lower aqueous flow. Our next step is to determine if there is an association in timolol response variation and beta-adrenergic receptor genotypes.

ACKNOWLEDGMENTS

Supported in part by the Summer Biomedical Research Program, University of Michigan (AT); NIH EY070703 Core Center for Vision Research, University of Michigan (DMF); Midwest Eye Banks and Transplantation Center (SEM); Career Development Award Research to Prevent Blindness (SEM); the University of Michigan Office of the Vice President for Research (SEM); the Glaucoma Research Foundation (SEM); NIH Grant R01-RO00042 (GC); Pfizer Inc., Allergan Inc. (R).

For questions, contact smoroi@med.umich.edu

REFERENCES


ABSTRACT (Revised)