

May Study of the Month

Effect of Mindfulness Meditation on Intraocular Pressure and Trabecular Meshwork Gene Expression: A Randomized Controlled Trial.

Summary by
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Introduction: Glaucoma is a common irreversible optic neuropathy characterized by progressive loss of retinal ganglion cells. Intraocular pressure (IOP) is the only modifiable risk factor identified in the progression of glaucoma, it is increased by psychological stress. Mindfulness meditation (MM) is a practice based in Buddhist philosophy that decreases the stress response, promotes a state of well-being, and improves outcomes in some chronic diseases. The purpose of this study was to determine the effects of MM on IOP.

Study Design: Randomized controlled trial

Population: 60 patients with primary open angle glaucoma, age greater than 40 years, visual acuity >20/200 corrected, IOP >21mmHg measured on 3 occasions, receiving maximum topical treatment, and an optic nerve head cupping > than 0.7.

Intervention: Participants were randomly assigned to either treatment or control groups and underwent baseline testing of IOP and GQL-15. Measurements were reassessed at the end of the study and trabeculectomy was performed to assess RNA expression of trabecular meshwork proteins. The treatment group received 45 minutes of MM daily for 21 days in addition to their current medical treatments. The control group received routine care and were scheduled for surgery after 3 weeks.

Outcome Measures: Percent reduction in IOP, diurnal fluctuation of IOP, change in quality of life (GQL-15), and trabecular meshwork gene expression were measured at the end of the study.

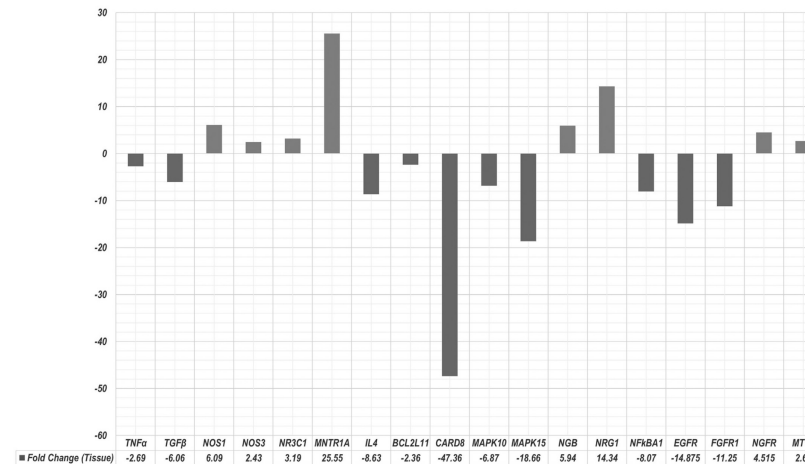


FIGURE 1. Diagram shows the fold change of gene expression in the trabecular meshwork of Group 1 compared to that in Group 2.

Results: The treatment group experienced a mean decrease of 5.0 ± 1.80 mmHg compared to 0.20 ± 3.03 in the control group ($p = .001$). The mean percentage of reduction in IOP was 23.34% ($p = .01$) for the treatment group, and 5.82% ($p = .38$) in the control group. The treatment group experienced an increased quality of life as GQL-15 scores dropped from 64.08 ± 4.56 to 40.04 ± 5.11 ($p = .0001$), with no significant change in the control group. Gene expression analysis in the treatment group showed significant upregulation of NGB, NGFR, NRG1, NOS1, NOS3, MNTR1A, NR3C1, and MT1E, and a significant downregulation of IL4, BCL2L11, CARD8, FEFR1, MAPK10, MAPK15, TGFB, TNFa, NFKB, and EGFR compared to the control group.

Discussion: MM was significantly effective in lowering IOP leading to a 50% decrease in need for filtration surgeries. Previous RCTs have shown similar results, however this study was the first to show that MM can decrease diurnal fluctuations in IOP. This was also the first study to report gene expression in RNA extracted directly from the trabecular meshwork. The authors identify small sample size and short duration of treatment as limitations to the study. The treatment group was under daily clinical observation which may have introduced bias by the Hawthorne effect. This study was conducted at the authors own ophthalmology clinic, reproduction at multiple centers may decrease bias and increase the statistical power of future studies.

What other chronic diseases could benefit from mindfulness meditation? How can we incorporate mindfulness practices into public health care?

Reference:

Dada T, Bhai N, Midha N, et al. Effect of Mindfulness Meditation on Intraocular Pressure and Trabecular Meshwork Gene Expression: A Randomized Controlled Trial. Am J Ophthalmol. 2021;223:308-321. doi:10.1016/j.ajo.2020.10.012

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