

Commentary: Exercise and Intraocular Pressure: Friends or foes?

"An early-morning walk is a blessing for the whole day."
– Henry David Thoreau

Intra-ocular pressure (IOP) is the only modifiable risk factor for glaucoma and sensitive to various hemodynamic changes in the body. Thankfully, with the advent of multiple anti-glaucoma drugs, IOP lowering has become an achievable task, yet almost every medication has some local and systemic side effects, which make the patient wary of using these medications. Glaucoma, being the most common cause of irreversible blindness, has a tremendous effect on the psychosocial well-being of the patient. In 10% of cases, glaucoma progresses despite low IOP, which implies the role of other factors such as low ocular perfusion pressure (OPP) in causation of glaucoma.^[1] Nevertheless, IOP still remains the only treatable entity in management of glaucoma.

Our Indian culture is rich in yogic practices aimed at keeping the body healthy and preventing diseases such as hypertension, diabetes and cardiovascular disease.^[2]

To be able to control intra-ocular pressure with natural therapy excluding any chemical intervention is indeed ideal. We do know that hypertension increases IOP.^[3] There is ample evidence that exercise and meditation can reduce hypertension and as a corollary should be beneficial to IOP as well.^[4]

The benefit of exercise in reducing IOP has been under study since 1965.^[5]

Studies have revealed that dynamic and isometric aerobic exercises reduce IOP and increase OPP.

Dynamic exercise is defined as work performed with change in muscle length, which is achieved by walking, running or cycling for a period of time. IOP has been evaluated in most of the studies before and after exercise at different

time intervals. Qureshi^[6] showed that IOP is lowered by 5.07 ± 1.76 mm Hg after jogging. Dynamic aerobic exercise reduces IOP by osmotic dehydration of the globe, reduced aqueous production because of reduced ultra-filtration and hypothalamic reflex.^[7]

On the other hand, isometric exercise defined as work performed by a muscle while maintaining constant muscle length as in squatting lowers IOP in the acute post-exercise period by 2.7 mm Hg because of induced hyper-ventilation and hypocapnia.^[8] Some studies report an increase in IOP post isometric exercises as they tend to focus on weight-lifting and exercise at maximal exertion, which causes breath holding leading to valsalva.^[9]

Avunduk *et al.*^[10] compared the IOP reduction post isometric and dynamic exercise and found that the IOP drop seen after isometric exercise was 4.94 ± 2.63 mmHg compared with a decrease of 8.78 ± 3.43 mm Hg seen after dynamic exercise.

Beneficial effects of aerobic exercises are not only limited to reducing the IOP; it also increases the OPP. A significant increase in OPP has been reported by Gracitelli *et al.* (21.7%)^[11] and Lovasik *et al.* (43%).^[12]

Often patients ask for lifestyle changes that they can incorporate to slow the progression of glaucoma. We always advise our patients to start brisk walking or jogging and avoid breath holding and inverted body yoga-asanas as it increases episcleral venous pressures.

With the general agreement in the literature and after half a century of work performed on the IOP lowering effect of exercise, it is clear that dynamic exercises transiently lower the IOP in the acute post-exercise period. Long-term physical fitness because of the daily exercise regime results in lower baseline IOP, although in fit individuals, the acute IOP-lowering effect of exercise may be diminished.

Therefore, we can say that glaucoma patients should be encouraged to exercise.

However, the rule does not apply universally.

It was seen by Shah *et al.*^[13] that young adults with advanced congenital or juvenile glaucoma experienced a “vascular steal” during exercise, which resulted in temporary loss of vision. It is also a well-known fact that exercise increases IOP in pigmentary glaucoma. Such individuals should be explained the possible effects of exercise.

The actual benefit would be much more clear once long-term studies bring out the steadiness of visual fields in exercising patients.

Like any other chronic disease, glaucoma is associated with anxiety and depression. These mental disorders not only have a negative impact on quality of life of the patients but also increase the IOP and cause insomnia.^[14] Exercise alleviates anxiety and depression, indirectly enhancing overall health and quality of life of the glaucoma patients.

Although the reduction of IOP after exercise lasts for about 1 hour, this IOP reduction is considered beneficial for the eye. Still, there is a need for further research to have an in-depth understanding of the subject. Nonetheless, exercise is a non-pharmacological intervention that increases the confidence of the glaucoma patients and also has a positive effect on their mental health.

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