



Effect of Mind-Body Therapy on Intraocular Pressure in Open-Angle Glaucoma Patients: A Systematic Review

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ABSTRACT

Open-angle glaucoma is one type of glaucoma that can damage the eye's optic nerve, causing blindness. Intraocular pressure (IOP) is the leading risk factor for open-angle glaucoma. So, controlling IOP is the goal of glaucoma management. One of the complementary therapies that glaucoma patients can choose is a mind-body therapy. The study aims to determine the effectiveness of mind-body therapy on IOP in glaucoma patients. A systematic literature review followed the PRISMA Flowchart guidelines in five databases (PubMed, ProQuest, ScienceDirect, Scopus, and Google Scholar). Inclusion criteria were articles published in the last ten years, English, and experimental studies about mind-body therapy's effect on glaucoma patients' intraocular pressure. The quality of articles was assessed using the JBI appraisal tools and analyzed using Meta-synthesis. We found two types of mind-body interventions that affect IOP: mindfulness meditation and yoga. Twelve articles showed that mind-body intervention had decreased IOP by 2 - 6 mmHg (5.7 - 16%). Only one article showed an increase in IOP (6 mmHg), namely yoga with a head down position (the head position lower than the heart position Mind-body therapy, particularly meditation and yoga, can significantly lower IOP. Special attention in yoga therapy is not to do the head down position because it can increase IOP. Mind-body therapy intervention as a complementary therapy can be applied to glaucoma patients to decrease IOP and prevent blindness.

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Kata kunci:

Glaukoma

sudut terbuka

terapi olah pikiran

tekanan intraokular

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ABSTRAK

Glaukoma sudut terbuka merupakan salah satu jenis glaukoma yang dapat merusak saraf optik mata sehingga menyebabkan kebutaan. Tekanan intraokular (IOP) adalah faktor risiko utama untuk glaukoma sudut terbuka. Jadi, mengendalikan TIO adalah tujuan dari manajemen glaukoma. Salah satu terapi komplementer yang dapat dipilih oleh pasien glaukoma adalah mind-body therapy. Penelitian ini bertujuan untuk mengetahui efektivitas mind-body therapy terhadap TIO pada pasien glaukoma. Tinjauan literatur sistematis dilakukan mengikuti panduan PRISMA Flowchart di lima database (PubMed, ProQuest, ScienceDirect, Scopus, dan Google Scholar). Kriteria inklusi adalah artikel yang diterbitkan dalam sepuluh tahun terakhir, bahasa Inggris, dan studi eksperimental tentang efek terapi pikiran-tubuh pada tekanan intraokular pasien glaukoma. Kualitas artikel dinilai menggunakan alat penilaian JBI dan dianalisis menggunakan Meta-sintesis. Kami menemukan dua jenis intervensi pikiran-tubuh yang memengaruhi TIO: meditasi mindfulness dan yoga. Dua belas artikel menunjukkan bahwa intervensi pikiran-tubuh telah menurunkan TIO sebesar 2 - 6 mmHg (5,7 - 16%). Hanya satu artikel yang menunjukkan peningkatan TIO (6 mmHg), yaitu yoga dengan posisi head down (posisi kepala lebih rendah dari posisi jantung. Mind-body therapy, khususnya meditasi dan yoga, dapat menurunkan TIO secara signifikan. Perhatikan

khusus pada yoga Terapi tidak dilakukan dengan posisi kepala menunduk karena dapat meningkatkan TIO. Intervensi mind-body therapy sebagai terapi komplementer dapat diterapkan pada pasien glaukoma untuk menurunkan TIO dan mencegah kebutaan.

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INTRODUCTION

Glaucoma is an eye disorder caused by damage to the optic nerve with several risk factors such as gender, age, history of glaucoma, vascular disease, and increased intraocular pressure (IOP) (Putri, Sutyan, & Triningrat, 2018; Rerung, Said, & Erika, 2020). A microvascular complication of diabetes can also cause glaucoma. Microvascular is a complication with disturbances in small blood vessels (Rondhianto, Nursalam, Kusnanto, & Melaniani, 2021). High intraocular pressure (IOP) will cause damage to the optic nerve, resulting in blindness that will affect daily life and the patient's quality of life (Rerung, Said, & Erika, 2020; Siswoyo, Kushariyadi, & Sukma, 2017). A previous study found that most glaucoma patients with IOP 30 mmHg are open-angle glaucoma (Baba, Idriss, Yahya, Batty, & Cheikh, 2020). Pharmacology therapy is the primary therapy for glaucoma but has several side effects. Such as allergies, dry eyes, tear film instability, endophthalmitis, cataracts, and blindness (Rerung et al., 2020).

Glaucoma patients can choose non-pharmacological complementary therapy to reduce the risk of side effects. A previous study stated that 10.9% of glaucoma patients used non-pharmacological therapy as a complementary therapy (Evangelho, Mastronardi, & de-la-Torre, 2019). Complementary therapy is one of the many options used as adjunctive therapy for glaucoma patients (Jaber, Ghannam, Rashed, Shehadeh, & Zyoud, 2021). One of the complementary therapies is mind-body therapy, which emphasizes meditation techniques in carrying out therapeutic procedures (Isnawati & Yunita, 2020).

Mindfulness meditation and yoga are part of mind-body therapy. Some yoga postures can result in the enhancement of IOP. However, practitioners recommend yoga to maintain eye health (Dimitrova & Trencova, 2017). Yoga practice with the head down affects the rapid increase in IOP in glaucoma patients and healthy eyes (Jasien, Jonas, Gustavo De Moraes, & Ritch, 2015). However, the explanation of how yoga and meditation interventions affect IOP control in glaucoma patients is unclear, and few studies have addressed this issue. Therefore, we attempted to conduct a systematic literature study regarding the effectiveness of mind-body therapy on IOP in glaucoma patients.

METHODS

This study is a systematic literature review. The study protocol carried out was adjusted to the PRISMA Flowchart. We conducted a literature search using five electronic databases (PubMed, Science Direct, ProQuest, Scopus, and Google Scholar) with keywords tailored to Medical Subject Headings (MeSH) and boolean operators. The articles were published in English until April 2022 and were searched and collected using the following keyword: "glaucoma" AND "mind-body therapy" OR "yoga" OR "hypnotherapy" OR "faith healing" OR "meditation" OR "spiritual therapies" AND "intraocular pressure OR" ocular hypertension." This study used the PICOS method as the inclusion criteria. The inclusion criteria: (1) open-angle glaucoma patients or elevated intraocular pressure; (2) mind-body therapy with a comparison with other interventions or control groups in the study; (3) the outcomes study was IOP; (4) study design were randomized controlled trials, cohort, quasi-experimental, and case reports. The Joanna Briggs Institute (JBI) Critical Assessment Tool appraises articles' quality. The articles meeting the JBI criteria (> 50%) were then analyzed using meta-synthesis.

RESULTS AND DISCUSSION

We found 8,288 articles from 5 databases (PubMed=29, ScienceDirect = 6,847, ProQuest = 321, Scopus = 7, and Google Scholar = 927). Articles were then filtered using PICOS inclusion criteria and JBI critical assessment tool. Finally, 13 articles have passed the screening stage (Figure 1).

The average age of the respondents was 50 years. Most respondents are men than women (300 Vs. 294), with an average IOP was 19,5 mmHg (Table 1). There are five articles discussing yoga ocular exercise interventions, five articles discussing mindfulness meditation interventions, 1 article discussing yoga pranayama intervention, 1 article discussing general yoga intervention, and 1 article discussing hatha yoga. Twelve articles showed a decrease in IOP in glaucoma patients, while 1 article showed a significant increase in IOP (Table 2).

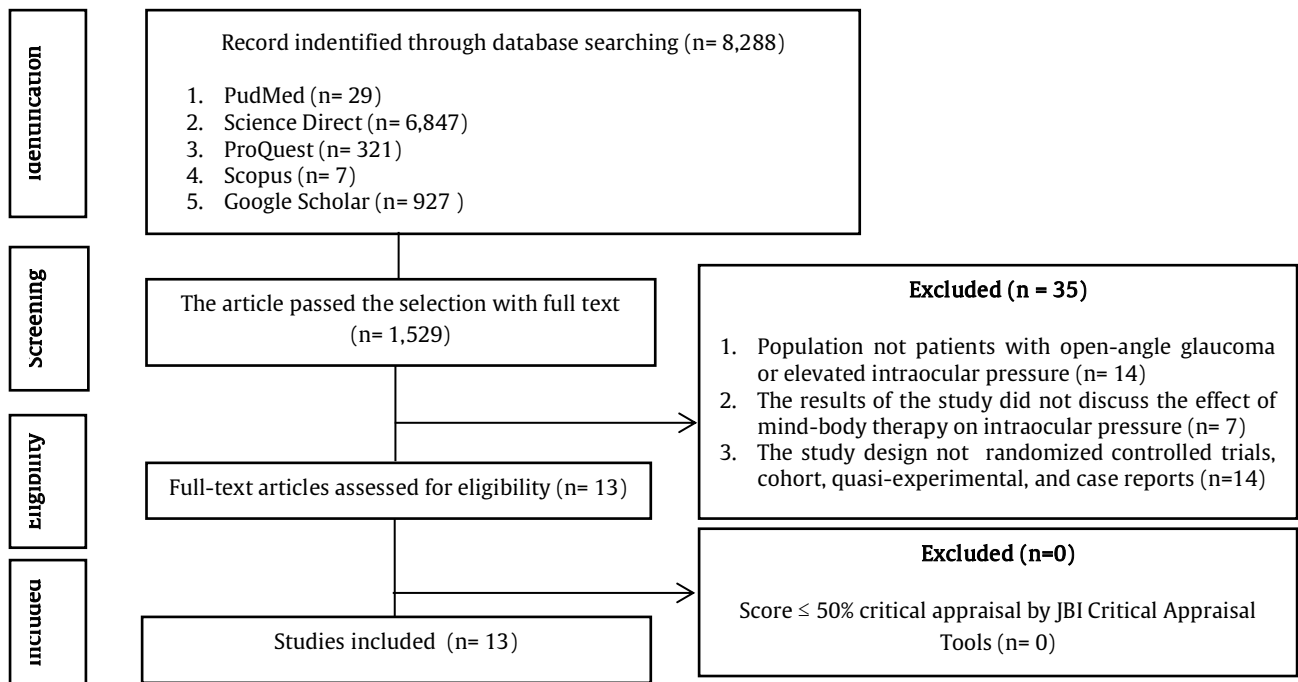


Figure 1. Diagram of Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)

Table 1
Characteristics of Included Articles

Author, year, country	Age (years)	Gender		Baseline IOP (mmHg)
		Male	Female	
Dada et al., 2021 (India)	50.23-53.23	47	13	18.26
Jasien et al., 2015 (New York)	36-62	3	17	16.75
Udenia et al., 2021 (India)	56.95-57.92	50	40	20.10
Dada et al., 2022 (India)	51.43-52.37	-	-	22.80
Dada et al., 2020 (India)	55.97	45	15	20.75
Dada et al., 2018 (India)	56.63-57.88	-	-	18.90
Ismail et al., 2021 (Cairo)	57.83-57.88	25	35	26.18
Gagrani et al., 2018 (India)	57.28	39	21	15.80
Ismail et al., 2021 (Cairo)	56.77-57.73	34	46	26.90
Dimitrova et al., 2015 (Macedonia)	45.92-46.27 (46)	6	17	16.08
Sankalp et al., 2022 (India)	45.50-47.50 (46,5)	38	34	16.20
Gupta S, K et al., 2019 (India)	20.94-21.07 (21)	13	18	16.40
Fandhira et al., 2017 (Indonesia)	33,32	0	38	-

Table 2
The Effect of Mind-Body Therapy on Intraocular Pressure

Author, year, country	Study Design (Design, Subject, Variable, Intervention, and Analysis)	Intraocular Pressure (mmHg)			Quality of articles
		Before	After	Decrease or Increase Average	
Dada et al., 2021 (India)	D : Randomized Control Trial	-	-	Decrease 15 %	84.61%
	S : 60 OAG patients				
	V : Mindfulness-based stress, optic disc perfusion, IOP				
	I : Mindfulness meditation				
	A : Independent t-test, Paired t-test				
Jasien et al., 2015 (New York)	D : Randomized Control Trial	17.00	28.5	Increase 6 mmHg (25%)	84.61%
	S : 10 OAG patients and individual healthy				
	V : Yoga postures, IOP				
	I : Yoga postures				
	A : Mixed effect linear models				
Udenia et al., 2021(India)	D : Randomized Control Trial	20.85	14.90	Decrease 6 mmHg (16%)	92.30%
	S : 90 OAG patients				

	V	:	Yoga pranayama, IOP				
	I	:	Yoga pranayama				
	A	:	Mann-Whitney test				
Dada et al., 2022 (India)	D	:	Randomized Control Trial	23.05	19.15	Decrease 3.9 mmHg (9.2%)	100%
	S	:	80 OAG patients				
	V	:	Mindfulness-based stress reduction, IOP				
	I	:	Mindfulness meditation				
Dada et al., 2020 (India)	A	:	Paired t-test and Independent-test	20.16	15.05	Decrease 5 mmHg (14.2%)	100%
	D	:	Randomized Control Trial				
	S	:	60 OAG patients				
	V	:	Mindfulness-based stress, optic disc perfusion				
Dada et al., 2018 (India)	I	:	Mindfulness meditation	19	13	Decrease 6 mmHg (18.75%)	100%
	A	:	Paired t-test, Independent t-test, Chi-square				
	D	:	Randomized Control Trial				
	S	:	90 OAG patients				
Ismail et al., 2021 (Mesir)	V	:	Mindfulness meditation, IOP, stress biomarkers, and gene expression	26,06	23,23	Decrease 2.83 mmHg (5.7%)	100%
	I	:	Mindfulness meditation				
	A	:	Paired t-test, Independent t-test, Chi-square				
	D	:	Randomized Control Trial				
Gagrani et al., 2018 (India)	S	:	90 OAG patients	15.9	14.4	Decrease 1.5 mmHg (5%)	92.30%
	V	:	Jyoti-trataka, IOP, autonomic control, and blood glucose				
	I	:	Ocular yoga exercise				
	A	:	Chi-square and Paired t-test				
	D	:	Randomized Control Trial				
	S	:	60 OAG patients				
	V	:	Meditation, brain oxygenation, quality of life				
	I	:	Ocular yoga exercise				
	A	:	Paired t-test, Independent t-test, and Mann Whitney				

DISCUSION

Characteristic respondent

The average age of the respondents in this study was 50 years. One previous study showed the respondent's age range was 32 – 62 years (Jasien et al., 2015). Several other studies have respondents with an average age of 50 and over. This result is in line with a study in Indonesia, where the characteristic age of glaucoma sufferers is 40-64 years (Pusvitasari, Agung, & Putrawati, 2018). Aging will increase the risk of chronic and multiple diseases, depression, pain, limited physical function, and cognitive impairment (Yodang, Harisa, & Syahrul, 2021). Age can be a risk factor because the eye's drainage system cannot function properly. So can increasing IOP, changes in elastin, and stiffness of type I collagen so that the elderly are prone to loss of visual function due to glaucoma, and a decrease in optic nerve function, causing an increase in IOP (McLaughlin et al., 2022; Putri et al., 2018).

Most respondents in this review were male. This study's results align with previous studies; most primary open-angle glaucoma (POAG) patients were male (Dada, Lahri, et al., 2021). Anatomical differences in the ocular structure can cause gender differences in the development of glaucoma. Males have a longer axial length than females, so they are prone to nerve layer damage, which results in faster and more severe glaucoma development. Male also have a larger anterior chamber, more profound, larger disc area, and thinner retinal nerve layer resulting in a higher IOP (Hashemi et al., 2019; Khachatryan et al., 2019).

The main risk factor for glaucoma is an increase in IOP. Respondents in this systematic review had an IOP of 19.5 mmHg on average across the literature analyzed. Nine articles indicated an IOP lower than 21 mmHg (Dada et al.,

2020; Dada, Bhair, et al., 2021b; Dimitrova & Trencova, 2017; Fandhira & Prihatningtias, 2017; Gagrani et al., 2018; Gupta & S.Aparna, 2019; Jasien et al., 2015; Sankalp, Dada, Yadav, & Faiq, 2018; Udenia et al., 2021). Meanwhile, four study articles have an average increase in IOP that tends to be high, reaching 27 mmHg (Dada, Bhair, et al., 2021; Dada et al., 2022a; Ismail, Abd Elfatah Abo Saif, & El-Moatasem Mohamed, 2021; Ismail & El-Azeim, 2021). Diurnal fluctuations and peak IOP significantly influence the development of glaucoma (Dada et al., 2022). An increase in eye pressure causes nerve fibers to compress, causing nerve optic damage. Increasing IOP is caused by high resistance to the flow of aqueous humor, which can cause damage to the optic nerve papilla and cause narrowing of the visual field (Maharani, 2018).

Mind-body therapy on glaucoma patients

Two mind-body therapies were found in this systematic review mindfulness meditation and yoga (ocular yoga exercise or tratak kriya, pranayama, hatha yoga). This study examines a 1-hour mindfulness meditation (MM) intervention by understanding breath and concentrating on the natural, relaxing flow of air in and out of the body. The patient sits in a chair with the back and spine straight and observes the rising and falling movements of the abdomen. Take a deep breath and hold for a few seconds, then exhale. Patients are advised to be alone and not disturbed (Dada et al., 2022). This intervention is in line with another study in which MM was performed for 45 minutes focusing on the relaxed flow of incoming air (Dada et al., 2020). The patient is sitting with a straight spine, focusing on abdominal breathing (Sankalp et al., 2018). Other studies discussing mindfulness meditation have the same principles but

different intervention durations (Dada, Lahri, et al., 2021; Sankalp et al., 2022).

Yoga practitioners have recommended ocular yoga exercises to maintain eye health (Dimitrova & Trencova, 2017). The first step is warming up by closing the eyes for relaxation. The second opens the eyes and performs eyeball movements vertically, horizontally, and circularly in a clockwise and anti-clockwise direction. The third step is the palming phase; the patient rubs his palms against each hand placed on the ipsilateral eye to warm it without applying intense pressure to the eyeball. Then followed by 4 phases, the first is the focusing phase for 3 minutes, then followed by the second phase, namely the intensive focusing phase for 15 minutes, the third phase is the blurring phase, and the fourth phase is the relaxation phase. This intervention was conducted for one month for minutes (Ismail, Abd Elfatah Abo Saif, & El-Moatasem Mohamed, 2021). Previous studies used the same technique, but with different durations and candlelight, so this can also be considered an option. However, its effectiveness still needs to be appropriately researched (Dimitrova & Trencova, 2017; Gupta & Aparna, 2019; Ismail, Abd Elfatah Abo Saif, & El-Moatasem Mohamed, 2021; Ismail & El-Azeim, 2021).

Pranayama's yoga technique is done in a sitting position. The patient inhales through the right nostril by closing the left nostril and vice versa; do this procedure several times. The next step is a diaphragmatic breathing exercise, which involves contraction between the diaphragm, abdominal expansion, and deep breathing (Udenia et al., 2021). In Hatha yoga, patients did breathing exercises (pranayama) and relaxation, not just positions (asanas). In the practice of Hatha yoga, there is a headstand position that rests on the head, but only the position with the head lower than the heart resting on the hands and feet (Fandhira & Prihatningtias, 2017). Meanwhile, previous studies conducted various yoga poses to see an increase in IOP. The head position lower than the feet can increase IOP (Jasien et al., 2015).

Effectiveness of mind-body therapy on intraocular pressure in glaucoma patients

Mindfulness meditation had significantly lower IOP in a glaucoma patient. The average percentage reduction in IOP in the intervention group was 23.34%, compared to the control group of 5.82% (Dada et al., 2020). The previous study also showed a decrease in the average IOP value in participants who completed a meditation course by more than 25% (Dada et al., 2020). Other studies also show that meditation can reduce IOP in the intervention group with an IOP reduction of 10-15% (Gagrani et al., 2018). Recent studies have also shown that MM can reduce IOP by more than 15% compared to a control group of only 4% (Dada, Lahri, et al., 2021). A recent study looking at a similar effect also showed a reduction in IOP in the intervention group by 16.83% compared to the control group by 0.77% (Dada et al., 2022b). Pranayama yoga practice in collaboration with diaphragmatic breathing also showed a decrease in IOP in glaucoma patients by an average of 4 mmHg (Udenia et al., 2021). A study on hatha yoga also showed a difference in the average IOP in the intervention group of 16,18 mmHg with the control group of 18,42 mmHg. Breathing exercise (pranayama) and relaxation significantly affect handling stress, decrease blood pressure, and lower psychological stress, affecting lowering IOP (Fandhira & Prihatningtias, 2017). Mindfulness meditation can reduce IOP and improve the quality of life without burdening the patient. This

intervention can also increase blood flow to the optic nerve so that it has the potential to prevent the development of ocular hypertension (Dada & Gagrani, 2019). This decrease in IOP can be associated with increased melatonin levels that negatively impact water production, decreased endogenous cortisol, or the parasympathetic and central nervous systems (Dada, Lahri, et al., 2021).

A decrease in IOP also occurred in the group given the Jyoti-Trataka intervention or tratak kriya, where the decrease in IOP in both eyes was 3.00 mmHg (Ismail et al., 2021). A similar study in which ocular yoga exercise has collaborated with the Acu- TENS intervention showed a 12% reduction in IOP percentage (Ismail & El-Azeim, 2021). Recent studies have shown a slight IOP reduction on days 14 and 28, with an average percentage of 5.3% (Sankalp et al., 2022). It is in line with previous studies, which also showed a decrease in IOP after a short intervention of ocular yoga exercise with an average of 2 mmHg (Dimitrova & Trencova, 2017). A decrease in IOP also occurred in studies with yoga ocular exercise intervention with an average decrease of 3,73 mmHg (12,3%) (Gupta & S.Aparna, 2019). During ocular yoga, the bulb motor muscles are maximally and continuously stretched in all directions, increasing intracranial blood circulation and having the potential as a pump for more efficient intraorbital venous outflow. Palming movements technique have a vasodilating effect on the episcleral veins, improving ocular outflow (Galina et al., 2020).

Most of the literature studies had resulted in IOP reduction. However, one study showed that yoga in various poses with the head lower than the feet significantly increases intraocular pressure. This study found that the pose with the head down for one minute will cause an increase in IOP in each pose for two values (Jasien et al., 2015). Yoga with head down position can increase hydrostatic pressure in the episcleral and orbital veins, which drain into the aqueous humor so that the pressure will directly affect the intraocular pressure. Another factor is the change in choroidal thickness. The choroid drained through the vortex vein, which continues into the superior ophthalmic vein and finally into the cavernous intracranial sinus. Changes in body position in intracranial cerebrospinal fluid pressure can indirectly affect venous pressure in the choroid and choroidal thickness or volume (Gupta & S.Aparna, 2019).

CONCLUSIONS AND SUGGESTIONS

Mind-body therapy effectively decreases IOP in open-angle glaucoma patients with a percentage of IOP decrease of up to 16%, so mind-body therapy, especially mindfulness meditation and yoga (ocular yoga exercise, pranayama yoga, and hatha yoga). Mindfulness meditation and yoga can be complementary therapy options in glaucoma patients to decrease IOP by not doing head down. Mind-body therapy intervention can be one of the therapeutic options used in nursing care for glaucoma patients by paying attention to the operational standards procedure.

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ETHICAL CONSIDERATIONS

No funding was received for conducting this study

Conflict of Interest Statement

There is no conflict of interest in this research

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