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Effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana, Gaomukhasana, Uttan Padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Sodhan Prayanam, Kapalbhati, Meditation on Intraocular Pressure and Tear Film Evaluation

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Abstract- Purpose: This study examines the impact of different yoga asanas and pranayama practices on intraocular pressure (IOP) and tear film stability. This research aims to assess the ocular health advantages of yoga by examining physiological factors related to eye pressure control and tear film stability. Methods: A cross-sectional study was performed on 40 persons aged 20 to 40 who consistently engaged in yoga practice. The participants completed pre- and post-exercise evaluations utilizing the Non-Contact Tonometer to determine intraocular pressure (IOP) and employed both the Tear Break-Up Test (TBUT) to analyze tear film stability. The yoga practice spanned 40-50 minutes and comprised asanas including Surya Namaskar, Tadasana, Vriksasana, Trikonasana, and Bhujangasana, along with breathing techniques such as Bhramari Pranayama, Anulom-Vilom, and Kapalbhati. The data analysis was to evaluate yoga's effect on ocular metrics. Results: Surya Namaskar markedly affected intraocular pressure and tear film stability, demonstrating a statistically significant difference relative to other yoga asanas. Tadasana, Vriksasana, Bhujangasana, and Virabhadrasana demonstrated minimal impact on intraocular pressure (IOP), whereas Kapalbhati resulted in a temporary elevation in IOP due to vigorous exhalation. Pranayama techniques, including Anulom-Vilom and Nadi Sodhan, exhibited a progressive reduction in intraocular pressure over time. Most yoga poses did not substantially affect tear film integrity, except Surya Namaskar, which showed a considerable influence. Conclusion: The research emphasizes Surya Namaskar as a potentially advantageous yoga practice for affecting intraocular pressure and tear film stability. Other yoga asanas have shown negligible effects, however, pranayama approaches demonstrated potential for long-term intraocular pressure stability. Additional research with expanded sample size is advised to corroborate these findings and investigate the therapeutic ramifications of yoga on eye health.

Keywords— Yoga, Intraocular Pressure, Tear Film Stability, Pranayama, Surya Namaskar, Non-Contact Tonometer.

I. INTRODUCTION

Yoga, an ancient practice originating in India, encompasses a range of physical postures (asanas), breathing techniques (pranayama), and s practices. These components are renowned for promoting holistic health, including physical, mental, and spiritual well-being. In recent years, scientific

investigations have delved into the specific effects of various yoga practices on ocular health, particularly focusing on intraocular pressure (IOP) and tear film stability. This comprehensive analysis examines the impact of specific asanas—Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana, Gaomukhasana, Uttan padasana—and pranayama—Bhramari, Shitali, Anulom-Vilom, Nadi Sodhan, Kapalbhati—as well as meditation on IOP and tear film dynamics.

Intraocular Pressure (IOP) and Its Significance

Intraocular pressure refers to the fluid pressure within the eye. Maintaining IOP within a normal range is crucial, as elevated IOP is a primary risk factor for glaucoma- a group of eye conditions that can lead to optic nerve damage and vision loss. Understanding how various activities, including yoga practices, influence IOP is essential for individuals at risk of or managing glaucoma.

Tear Film and Ocular Surface Health

The tear film is a thin layer covering the ocular surface, playing a vital role in maintaining eye health, providing lubrication, supplying nutrients, and offering protection against environmental insults. Disruptions in tear film stability can lead to dry eye syndrome and other ocular surface disorders. Exploring the impact of yoga on tear film parameters offers insights into non-pharmacological approaches to enhancing ocular surface health.

Impact of Specific Asanas on Intraocular Pressure

Surya Namaskar (Sun Salutation): Surya Namaskar is a dynamic sequence of twelve poses performed in a flowing manner, often used as a warm-up in yoga sessions. This sequence involves forward bends and inversions, which can influence IOP. A study evaluating the effect of various asanas, including Surya Namaskar, on IOP found a significant mean reduction in IOP over 12 weeks. Participants practiced Surya Namaskar for five minutes daily, five days a week, leading to a consistent decrease in IOP measurements. This suggests that regular practice of Surya Namaskar may contribute to lowering IOP in healthy individuals.[1]

Tadasana (Mountain Pose): Tadasana is a foundational standing pose emphasizing alignment and balance. While specific studies on Tad asana's direct effect on IOP are limited, its role in promoting relaxation and reducing stress may indirectly benefit ocular health. Stress is known to influence systemic blood pressure, which can, in turn, affect IOP. By fostering a state of calm, Tadasana may help in maintaining stable IOP levels.[2]

Vriksasana (Tree Pose): Vriksasana involves balancing on one leg, promoting concentration and stability. Although direct research on Vriksasana 's impact on IOP is scarce, balance poses like Vriksasana enhance overall circulation and reduce stress, potentially contributing to ocular health. Improved systemic circulation ensures adequate blood flow to the optic nerve, supporting its function and health.[3]

Trikonasana (Triangle Pose): Trikonasana is a lateral standing pose that stretches the body and improves flexibility. There is a lack of direct studies on the Trikonasana effect on IOP. However, as a non-inverted pose, it is less likely to cause significant fluctuations in IOP. Incorporating Trikonasana into a yoga routine may aid in overall physical well-being without adversely affecting intraocular pressure.[4]

Bhujangasana (Cobra Pose): Bhujangasana involves lying prone and lifting the upper body, promoting spinal flexibility. Specific research on Bhujangasana's direct impact on IOP is limited. Given its non-inverted nature, it is unlikely to cause significant increases in IOP. Regular practice of Bhujangasana may enhance overall circulation and reduce tension, potentially benefiting ocular health indirectly.[5]

Virabhadrasana (Warrior Pose): Virabhadrasana comprises a series of standing poses that build strength and stamina. Direct studies on the Virabhadrasana effect on IOP are not readily available. However, as these poses do not involve inversion, they are less likely to elevate IOP. The emphasis on deep breathing and focus during Virabhadrasana may aid in stress reduction, indirectly supporting stable IOP levels.[6]

Tulasana (Scale Pose): Tulasana is an arm-balancing pose requiring core strength and concentration. There is a paucity of research on Tulasana's direct impact on IOP. Given that it involves lifting the body with the head remaining above the heart, it is less likely to cause significant IOP elevation. Practicing Tulasana may improve upper body strength and focus, contributing to overall well-being. [7]

Matsyadrasana (Seated Spinal Twist): Matsyadrasana involves twisting the spine, promoting flexibility and digestion. Specific studies on its effect on IOP are limited. As a seated, non-inverted pose, Matsyadrasana is unlikely to adversely affect IOP. Incorporating this pose may aid in reducing tension and improving circulation, indirectly benefiting ocular health [8].

Garudasana (Eagle Pose): Garudasana is a standing balance pose that involves wrapping the arms and legs, enhancing focus and coordination. Direct research on Garudasana's impact on IOP is lacking. However, as a non-inverted pose, it is less likely to cause significant changes in IOP. The concentration required Garudasana, or Eagle Pose, is a standing balance posture that involves wrapping the arms and legs around each other, enhancing focus and coordination. While direct research on Garudasana's impact on intraocular pressure (IOP) is limited, its non-inverted nature suggests it is less likely to cause significant changes in IOP. The concentration required to maintain this pose may promote mental clarity and reduce stress, potentially benefiting overall ocular health.[9]

Beyond its implications for IOP, Garudasana offers several physical benefits. The pose improves body balance by requiring the practitioner to stabilize on one leg, which can help individuals regain coordination and stability. Additionally, the pose enhances focus and concentration, as maintaining balance necessitates mental attention and awareness. Physically, Garudasana strengthens the legs and increases flexibility in the hips and shoulders, contributing to overall musculoskeletal health.

In the context of yoga and its effects on intraocular pressure, it's important to note that certain inverted poses have been associated with increased IOP. For instance, positions like Adho Mukha Svan asana (Downward Facing Dog) have shown significant IOP elevations during practice. However, non-inverted poses such as Garudasana do not place the head below the heart, thereby minimizing the risk of IOP spikes.

II. REVIEW OF LITERATURE

Yoga, an ancient practice integrating physical postures (asanas), breathing techniques (pranayama), and meditation, has been explored for its potential effects on ocular health, particularly intraocular pressure (IOP) and tear film stability. This review examines existing literature on the impact of specific yoga practices—including Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana, Gaomukhasana, Uttan padasana, Bhramari Pranayama, Shitali Pranayama, Anulom-Vilom Pranayama, Nadi Sodhan, Pranayama, Kapalbhati, and meditation—on IOP and tear film dynamics.

Intraocular Pressure (IOP) and Yoga Practices

Elevated IOP is a significant risk factor for glaucoma, a leading cause of irreversible blindness worldwide. Traditional management focuses on lowering IOP to prevent optic nerve damage. Recent studies have investigated the role of yoga in modulating IOP, with varying outcomes depending on the specific practice.

A systematic review by Ranjan et al. (2023) evaluated the effects of yoga on IOP in glaucoma patients. The review included six studies conducted between 2007 and 2021, assessing practices such as Jyoti-Taraka (steady gazing) and slow yogic breathing techniques. Findings indicated that while certain yogic practices might reduce IOP, inversion asanas (poses where the head is below the heart) were associated with a rapid increase in IOP. The authors emphasized the need for larger, long-term studies to substantiate these findings.[10]

Similarly, a narrative review by Senthil Kumar and John (2022) analyzed ancient texts and contemporary research on Trataka, a yogic ocular exercise involving focused gazing. The review suggested the potential benefits of Trataka in regulating autonomic functions and enhancing ocular health. However, the limited number of studies and variations in methodology necessitate cautious interpretation of these results.[11]

In contrast, a randomized controlled trial by Sankalp et al. (2018) examined the effect of Trataka on IOP in glaucoma patients. The study concluded that the specific yoga-based ocular exercises practiced did not significantly impact IOP, highlighting the complexity of yoga's effects on ocular physiology.[12]

Furthermore, a meta-analysis by Zhang et al. (2023) investigated the impact of relaxation exercises, including yoga, on IOP levels. The analysis revealed a significant reduction in IOP following relaxation exercises, suggesting their potential as adjunctive therapies for glaucoma management. However, the authors called for further research to confirm these effects and understand the underlying mechanisms.[13]

Tear Film Stability and Yoga Practices

The tear film is essential for maintaining ocular surface health and clear vision. Disruptions in tear film stability can lead to dry eye syndrome and other ocular surface disorders. While the impact of yoga on tear film dynamics is less extensively studied, some insights are available.

An article by Medical News Today (2021) discussed the potential benefits of eye yoga exercises for dry eyes. While anecdotal reports suggest that such practices may alleviate symptoms of eye strain and dryness, the article emphasized the lack of scientific evidence supporting the efficacy of eye yoga in treating dry eye conditions. Therefore, while these exercises may promote relaxation, they should not replace conventional treatments for ocular surface disorders.[14]

Aerobic exercise has been investigated for its effects on tear secretion and tear film stability. A study published in Contact Lens & Anterior Eye examined the impact of aerobic exercise on individuals with DED. The findings indicated that participants experienced increased tear secretion and improved tear film stability post-exercise, suggesting that aerobic activities may serve as a potential therapeutic approach for managing dry eye symptoms.[15]

Similarly, the research highlighted by the University of Waterloo reported that regular aerobic exercise led to significant enhancements in tear secretion and tear film stability among participants. These improvements were associated with relief from dry, itchy eyes, underscoring the potential benefits of incorporating physical activity into routines for ocular health.[16]

The existing literature presents a nuanced view of yoga's impact on intraocular pressure and tear film stability. Certain practices, particularly non-inverted asanas, and specific pranayama's, may offer benefits in reducing IOP and promoting ocular health. However, inversion poses have been associated with increased IOP, posing potential risks for individuals with glaucoma. The effects of yoga on tear film stability remain underexplored, with limited evidence supporting its efficacy in managing dry eye conditions. Given these findings, further rigorous, large-scale studies are necessary to elucidate the specific benefits and risks of various yoga practices on ocular health.

Aim & Objectives

Aim

- To investigate the effects of specific yoga practices—including Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana, Gaomukhasana, Uttan padasana, Bhramari Pranayama, Shitali Pranayama, Anulom-Vilom Pranayama, Nadi Sodhan Pranayama, Kapalbhati, and meditation—on intraocular pressure (IOP) and tear film stability in individuals, to determine their potential therapeutic benefits for ocular health.

- The primary objectives of this study are:
- To compare the pre and post-test scores of intraocular pressures by performing yoga asanas.
- To compare the pre and post-test score of film stability by performing yoga asanas.

III. METHODOLOGY

Study Design: Experimental

Study Population: The study population consisted of adults aged 18 to 30 years who consistently participated in yoga programs for health maintenance. The sample comprised both regular and infrequent yoga practitioners.

Sample size and techniques: A purposive sample technique was utilized to identify 61 participants who fulfilled the inclusion criteria.

Study Area: The research was conducted in Haryana.
Inclusion Criteria:

- Participants comprised non-glaucoma
- individuals aged 18-30 years
- who engaged in Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana, Gaomukhasana, Uttan Padasana, Bhramari Pranayama, Shitali Pranayama, Anulom-Vilom Pranayama, Nadi Sodhan Pranayama, Kapalbhati, and Meditation.
- The study comprised participants of both genders.
- devoid of injuries or media opacities.

Exclusion Criteria

- Participants diagnosed with glaucoma
- Diabetes
- Cataracts
- ametropia above 1 dioptre
- genetic disorders
- those engaging in extreme head-down yoga poses (including Shirshasana, Ardha Chandrasana, Paschim Uttan asana, Halasana, and Chakarasana) were excluded.

Instruments and Tools Used

- Topcon CT-80 non-contact tonometer (used for assessing intraocular pressure by the Imbert-Fick principle)
- OptiGlo Fluorescein Sodium Strips
- Heines Retinoscopy
- Tear Break-Up Time Test (TBUT) (for evaluating tear film stability)
- OMRON Bp machine
- Analysing tool Spss 22.0

Protocol

- The baseline intraocular pressure was assessed using the Non-Contact Tonometer before the yoga session.
- The stability of the tear film was evaluated using the Tear Break-Up Test.
- Participants participated in a 40–50-minute yoga practice comprising asanas and pranayama.
- Intraocular pressure was re-evaluated following exercise with the Non-Contact Tonometer.
- The stability of the tear film was reassessed utilizing both the Tear Breakup Time (TBUT).

Measurement Techniques

- Noncontact Tonometry: Noncontact tonometry, or air-puff tonometry, is a test used to measure intraocular pressure (IOP) without touching the eye. This test is especially helpful in detecting increased IOP and does not necessitate the use of numbing eye drops.
- The participants will be instructed to rest their chin on a padded support in a comfortable position with their eyes open and looking straight ahead into the device.
- A quick puff of air will be blown against the surface of the eye. Though the participant will detect a slight puffing noise and perhaps a cool feeling or pressure, there will not be any pain.
- The IOP is measured by recording the deflection of the light reflected from the cornea as it is deflated by the air puff by a small amount.
- The test is repeated several times for each eye to get reliable readings.
- Tear Break-Up Time (TBUT): The Tear Break-Up Time (TBUT) test is a routine and non-surgical test for measuring the tear film stability on the eye's surface. It is usually done to check for dry

eye conditions or whether there is decreased tear production or increased evaporation of tears.

- The participant will sit comfortably in front of the slit lamp, and the observer will request that they stare straight ahead and not blink while taking the test.
- A minimal amount of fluorescein dye, usually a drop or a strip, will be placed on the surface of the participant's eye. The use of fluorescein dye helps to illuminate the tear film and enables the observer to see how it moves under the slit lamp.
- With the slit lamp, the observer will direct a cobalt blue light onto the eye to make the fluorescein dye fluoresce. The observer will then note the stability of the tear film by observing the time it takes for dry spots to form on the cornea (tear break-up) after the participant blinks and assumes a steady gaze.
- The observer will monitor the cornea carefully for any abnormalities in the tear film. The interval between the previous blink and the development of the first dry area on the cornea is measured. This is the TBUT.
- Normal TBUT is usually 10-20 seconds.
- Short TBUT (less than 10 seconds) is a sign of an unstable tear film and can be indicative of dry eye disease or other ocular surface disease.
- Repetition (If required): The test may be repeated if required to ascertain accuracy. The test might be done on both eyes in certain situations for comparison by the observer.
- Blood Pressure: Place the cuff on the participant's upper arm, about 1 inch (2-3 cm) above the elbow crease. Ensure the cuff is snug but not too tight (fit one finger under the cuff). Press the power/start button. The cuff will inflate and then deflate automatically. Do not talk or move while the machine takes the reading. The monitor will display Systolic BP (higher number) and Diastolic BP (lower number). It may also show Pulse Rate (heartbeats per minute).

Procedure

- Individuals with any eye disease, children, and patients with systemic comorbidities including uncontrolled diabetes, uncontrolled hypertension, severe cardiac illness, renal, liver, and respiratory diseases were not included in the study.
- Whereas, 61 subjects did all the asanas (except Shirshasana and Bhastrika Pranayama) for 5 minutes each, with a resting period of 5-10 minutes between two asanas. One skilled Yoga teacher supervised the Yoga exercise. Participants took medication after the Yoga session.
- Each subject went through baseline ophthalmic studies like Snellen's distance vision and near vision visual acuity and pin-hole vision, old glass power. We recorded the IOP of both eyes of the subjects for every pose. The IOP was recorded after every asana. A time gap of 5-7 minutes is provided so that the effect of the last asana gets diminished and does not influence the reading of the subsequent asana

Clinical Significance

The objective of this study is to ascertain yoga techniques that exert negligible effects on elevating intraocular pressure. This research enhances comprehension of the possible ocular advantages of yoga by assessing the impact of various asanas and pranayama techniques on tear film stability and intraocular pressure (IOP). The incorporation of breathing techniques such as pranayama may elucidate its function in mitigating stress-related IOP variations and enhancing ocular health.

IV. RESULTS

1. Plan for Statistical Analysis

Demographic Questions

Table 1: Frequency percentage of Age

Age		
	Frequency	Percent
18-20	15	24.6
21-25	32	52.5
26-30	14	23.0
STotal	61	100.0

The distribution of the respondents by age shows that the largest group is 21-25 years old, making up 52.5% (32 individuals) of the total sample. The 18-20 age group makes up 24.6% (15 individuals), and the 26-30 age group has the smallest proportion at

23.0% (14 individuals). The sample size is 61, and the data shows that most of the respondents are in their early to mid-twenties, which could influence the context of the study.

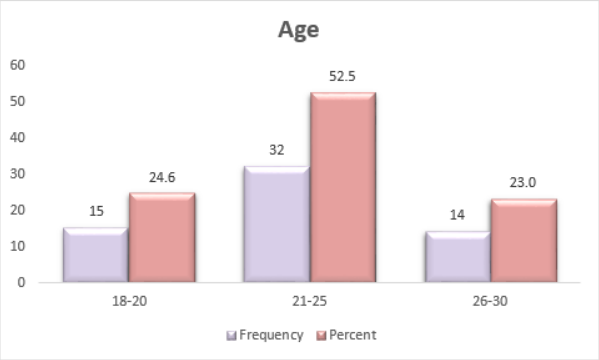

Figure 1: Graphical presentation of Age

Table 2: Frequency percentage of Gender

Gender		
	Frequency	Percent
Male	30	49.2
Female	31	50.8
Total	61	100.0

The gender distribution of respondents is almost equal with a slight majority of women. Out of 61 participants, 31 (50.8%) are female and 30 (49.2%) are male. Such balanced representation ensures that the study includes perspectives of both genders without significant bias, allowing for a more comprehensive analysis of the findings.

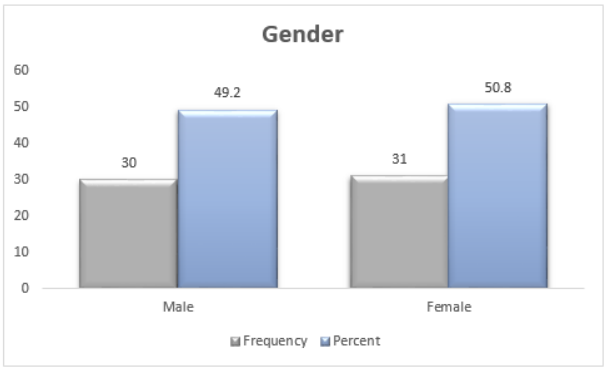

Figure 2: Graphical presentation of Gender

Hypothesis 1

- H0: There is no effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana on Before Yoga IOP Right and Left Eye.
- H1: There is a significant effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana on Before Yoga IOP Right and Left Eye.

Table 3: Hypothesis 1 test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before Yoga IOP Right Eye - Before Yoga IOP Left Eye	-.295	3.288	.421	-1.137	.547	-.701	60	.486
Pair 2	Surya Namaskar Right Eye - Surya Namaskar Left Eye	-7.246	3.501	.448	-8.142	-6.349	-16.166	60	.000

Pair 3	Tadasana Right Eye - Tadasana Left Eye	-.475	3.107	.398	-1.271	.320	-1.195	60	.237
Pair 4	Vriksasana Right Eye - Vriksasana Left Eye	-1.000	4.058	.520	-2.039	.039	-1.925	60	.059
Pair 5	Trikonasana Right Eye - Trikonasana Left Eye	-1.016	4.452	.570	-2.156	.124	-1.783	60	.080
Pair 6	Bhujangasana Right Eye - Bhujangasana Left Eye	-.180	3.533	.452	-1.085	.725	-.399	60	.692
Pair 7	Virabhadrasana Right Eye - Virabhadrasana Left Eye	-.525	3.910	.501	-1.526	.477	-1.048	60	.299
Pair 8	Tulasana Right Eye - Tulasana Left Eye	.656	4.127	.528	-.401	1.713	1.241	60	.219
Pair 9	Matsyadrasana Right Eye - Matsyadrasana Left Eye	.066	4.328	.554	-1.043	1.174	.118	60	.906
Pair 10	Garudasana Right Eye - Garudasana Left Eye	-.377	3.773	.483	-1.343	.589	-.780	60	.438

The paired samples test measures differences in intraocular pressure (IOP) of the right and left eyes before yoga and after performing specific yoga asanas.

The results show that the intraocular pressure (IOP) between the left and right eyes was not significantly different before yoga ($p = 0.486$), meaning both eyes had similar baseline pressure. Out of the yoga poses, Surya Namaskar alone showed a statistically significant difference ($p = 0.000$), reflecting its considerable influence on the interocular pressure difference between the left and right eyes. The other asanas, like Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, and Garudasana, did not have any meaningful differences ($p > 0.05$), suggesting that their effect on intraocular pressure fluctuation between the two eyes was not meaningful or statistically insignificant. Overall, Surya Namaskar significantly affected the intraocular pressure difference between the right and left eyes, while the other asanas had no significant effect. This suggests that Surya Namaskar can specifically impact intraocular pressure, possibly in the control thereof,

but the effects of other postures need further investigation.

Paired Samples Effect Sizes						
			Standardize	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Before Yoga IOP Right Eye - Before Yoga IOP Left Eye	Cohen's d	3.288	-.090	-.341	.162
		Hedges' correction	3.309	-.089	-.339	.161
Pair 2	Surya Namaskar Right Eye - Surya Namaskar Left Eye	Cohen's d	3.501	-2.070	-2.513	-1.620
		Hedges' correction	3.523	-2.057	-2.498	-1.610
Pair 3	Tadasana Right Eye - Tadasana Left Eye	Cohen's d	3.107	-.153	-.405	.100
		Hedges' correction	3.127	-.152	-.402	.099
Pair 4	Vriksasana Right Eye - Vriksasana Left Eye	Cohen's d	4.058	-.246	-.500	.009
		Hedges' correction	4.083	-.245	-.497	.009
Pair 5	Trikonasana Right Eye - Trikonasana Left Eye	Cohen's d	4.452	-.228	-.482	.027
		Hedges' correction	4.480	-.227	-.479	.027
Pair 6	Bhujangasana Right Eye - Bhujangasana Left Eye	Cohen's d	3.533	-.051	-.302	.200
		Hedges' correction	3.555	-.051	-.300	.199
Pair 7	Virabhadrasana Right Eye - Virabhadrasana Left Eye	Cohen's d	3.910	-.134	-.386	.118
		Hedges' correction	3.934	-.133	-.383	.118
Pair 8	Tulasana Right Eye - Tulasana Left Eye	Cohen's d	4.127	.159	-.094	.411
		Hedges' correction	4.153	.158	-.094	.408
Pair 9	Matsyadrasana Right Eye - Matsyadrasana Left Eye	Cohen's d	4.328	.015	-.236	.266
		Hedges' correction	4.355	.015	-.234	.264
Pair 10	Gaurdasana Right Eye - Gaurdasana Left Eye	Cohen's d	3.773	-.100	-.351	.152
		Hedges' correction	3.797	-.099	-.349	.151

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

The paired samples effect sizes table shows Cohen's d and Hedges' correction for comparing intraocular pressure (IOP) differences between the right and left eyes before and after the performance of specific yoga asanas. Cohen's d is an effect size measure, where values close to 0 indicate an insignificant

effect, values between 0.2 and 0.5 suggest a small effect, and values greater than 0.8 indicate a strong effect. Hedges' correction is a revised version of Cohen's d that corrects for bias in small samples. The results show that Surya Namaskar exerted a significant effect size (Cohen's d = -2.070, Hedges' = -2.057), suggesting a strong impact on the difference in intraocular pressure between the right and left eyes.

This is in agreement with the previous research that has shown that Surya Namaskar produced a statistically significant change in intraocular pressure (IOP). In contrast, all the remaining poses, including Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, and Garudasana, had small or no effect sizes (Cohen's d from -0.246 to 0.159), which reflect minimal influence on the variations of IOP. The confidence intervals for these postures are mostly centered around zero, thus lending support to the inference that their effects weren't statistically significant. The results show that Surya Namaskar had a considerable effect on the intraocular pressure differences between the right and left eyes, while other asanas did not result in notable changes. This highlights the potential effect of Surya Namaskar on ocular pressure; however, further studies might be necessary to evaluate the effectiveness of other yoga poses.

Hypothesis 2:

- H0: There is no effect of Gaomukhasana, Uttan padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Sodhan Prayanam, Kapalbhati, Meditation on Before Yoga IOP Right and Left Eye.
- H1: There is a significant effect of Gaomukhasana, Uttan padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Sodhan Prayanam, Kapalbhati, Meditation on Before Yoga IOP Right and Left Eye.

Table 4: Hypothesis 2 test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before Yoga IOP Right Eye - Before Yoga IOP Left Eye	-.295	3.288	.421	-1.137	.547	-.701	60	.486
Pair 2	Gomukhasana Right Eye - Gomukhasana Left Eye	.098	3.919	.502	-.905	1.102	.196	60	.845
Pair 3	Uttan Padasana Right Eye - Uttan Padasana Left Eye	.770	3.997	.512	-.253	1.794	1.505	60	.137
Pair 4	Bhramari Pranayam Right Eye - Bhramari Pranayam Left Eye	-.049	3.485	.446	-.942	.843	-.110	60	.913

Pair 5	Shitali Pranayam Right Eye - Shitali Pranayam Left Eye	-.492	4.403	.564	-1.619	.636	-.872	60	.386
Pair 6	Anulom- Vilom Pranayam Right Eye - Anulom-Vilom Pranayam Left Eye	.049	2.723	.349	-.648	.747	.141	60	.888
Pair 7	Nadi Shodhana Pranayam Right Eye - Nadi Shodhana Pranayam Left Eye	-.410	4.310	.552	-1.514	.694	-.743	60	.461
Pair 8	Kapalbhati Right Eye - Kapalbhati Left Eye	-.836	5.336	.683	-2.203	.531	-1.224	60	.226
Pair 9	Meditation Right Eye - Meditation Left Eye	-.705	3.809	.488	-1.681	.271	-1.445	60	.154

The paired samples test assesses the impact of Gaomukhasana, Uttan Padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Shodhana Pranayam, Kapalbhati, and Meditation on the differences in intraocular pressure (IOP) between the right and left eyes.

The results prove that there is no statistically significant difference in intraocular pressure (IOP) between the left and right eyes before yoga ($p = 0.486$), showing that both eyes had similar initial pressure levels. Additionally, no yoga asanas or pranayama techniques examined in this study prove to have significant effects on IOP fluctuations, as all p-values greater than 0.05. The confidence intervals of all the pairs include 0, meaning that any differences found might be due to random variation and not an actual effect. The greatest mean difference is reported for Kapalbhati (-0.836) and Meditation (-0.705); however, these changes are not statistically significant ($p = 0.226$ and $p = 0.154$, respectively). The results show that these asana and pranayama methods don't make a significant difference in the intraocular pressure differences between the right and left eye. While they might have other health benefits, their effect on intraocular pressure appears to be zero based on this research. Further studies with a larger sample size or longer intervention duration might be needed to explore their potential influence on eye health.

Paired Samples Effect Sizes						
			Standardize	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Before Yoga IOP Right Eye - Before Yoga IOP Left Eye	Cohen's d	3.288	-.090	-.341	.162
		Hedges' correction	3.309	-.089	-.339	.161

Pair 2	Gomukhasana Right Eye - Gomukhasana Left Eye	Cohen's d	3.919	.025	-.226	.276
		Hedges' correction	3.943	.025	-.225	.274
Pair 3	Uttan Padasana Right Eye - Uttan Padasana Left Eye	Cohen's d	3.997	.193	-.061	.445
		Hedges' correction	4.023	.192	-.061	.442
Pair 4	Bhramari Pranayam Right Eye - Bhramari Pranayam Left Eye	Cohen's d	3.485	-.014	-.265	.237
		Hedges' correction	3.507	-.014	-.263	.235
Pair 5	Shitali Pranayam Right Eye - Shitali Pranayam Left Eye	Cohen's d	4.403	-.112	-.363	.141
		Hedges' correction	4.431	-.111	-.361	.140
Pair 6	Anulom- Vilom Pranayam Right Eye - Anulom- Vilom Pranayam Left Eye	Cohen's d	2.723	.018	-.233	.269
		Hedges' correction	2.740	.018	-.232	.267
Pair 7	Nadi Shodhana Pranayam Right Eye - Nadi Shodhana Pranayam Left Eye	Cohen's d	4.310	-.095	-.346	.157
		Hedges' correction	4.338	-.094	-.344	.156
Pair 8	Kapalbhati Right Eye – Kapalbhati Left Eye	Cohen's d	5.336	-.157	-.409	.096
		Hedges' correction	5.370	-.156	-.406	.096
Pair 9	Meditation Right Eye - Meditation Left Eye	Cohen's d	3.809	-.185	-.437	.069
		Hedges' correction	3.833	-.184	-.435	.068

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

The paired samples effect sizes table shows Cohen's d and Hedges' correction to measure the size of differences in intraocular pressure (IOP) between the right and left eyes before and after the performance of Gaomukhasana, Uttan Padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Shodhana Pranayam, Kapalbhati, and Meditation.

Values of Cohen's d close to 0 indicate minimal effect, 0.2 to 0.5 represent a small effect, and >0.8 represent a large effect. It is clear from this analysis that all effect sizes are negligible or trivial with values of Cohen's d from -0.185 to 0.193 representing small differences in intraocular pressure between the right and left eye after these exercises. The confidence intervals for each of the pairs include 0, thus emphasizing the lack of a significant effect. Uttan Padasana (d = 0.193) has the largest effect size, showing a slight tendency towards significance, but it is statistically insignificant. Kapalbhati (-0.157) and Meditation (-0.185) show marginally negative effects, but these are limited to a small range.

The results show that none of the tested yoga asanas or pranayama practices produced a significant effect on intraocular pressure differences between the right and left eyes. The small effect sizes suggest that any changes found might be due to random variation instead of a real effect. Further studies with

a larger sample size or longer duration might be required to determine if these behaviors have a sustained effect on intraocular pressure regulation.

Hypothesis 3

- H0: No effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana on Before Yoga TBUT Right and Left Eye.
- H1: There is a significant effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana on Before Yoga TBUT Right and Left Eye.

Table 5: Hypothesis 3 test

Paired Samples Test									
		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before Yoga TBUT Right Eye - Before Yoga TBUT Left Eye	.016	3.284	.420	-.825	.857	.039	60	.969
Pair 2	Surya Namaskar Right Eye - Surya Namaskar Left Eye	-7.246	3.501	.448	-8.142	-6.349	-16.166	60	.000
Pair 3	Tadasana Right Eye - Tadasana Left Eye	-.475	3.107	.398	-1.271	.320	-1.195	60	.237
Pair 4	Vriksasana Right Eye - Vriksasana Left Eye	-1.000	4.058	.520	-2.039	.039	-1.925	60	.059
Pair 5	Trikonasana Right Eye - Trikonasana Left Eye	-1.016	4.452	.570	-2.156	.124	-1.783	60	.080
Pair 6	Bhujangasana Right Eye - Bhujangasana Left Eye	-.180	3.533	.452	-1.085	.725	-.399	60	.692
Pair 7	Virabhadrasana Right Eye - Virabhadrasana Left Eye	-.525	3.910	.501	-1.526	.477	-1.048	60	.299
Pair 8	Tulasana Right Eye - Tulasana Left Eye	.656	4.127	.528	-.401	1.713	1.241	60	.219

Pair 9	Matsyadrasana Right Eye - Matsyadrasana Left Eye	.066	4.328	.554	-1.043	1.174	.118	60	.906
Pair 10	Gaurdasana Right Eye - Gaurdasana Left Eye	-.377	3.773	.483	-1.343	.589	-.780	60	.438

The paired samples test compares the effect of various yoga asanas on the variation in tear break-up time (TBUT) between the right and left eyes before and following the practice of yoga. The results show no statistical difference in TBUT between the right and left eyes before yoga ($p = 0.969$), which means both eyes had similar baseline tear stability. Out of the asanas, Surya Namaskar alone showed a very highly significant difference ($p < 0.001$) with a mean difference of -7.246 and had a big effect on tear film stability. However, all the remaining asanas, like Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, and Garudasana, did not have any statistically significant effects ($p > 0.05$). While Vriksasana ($p = 0.059$) and Trikonasana ($p = 0.080$) showed marginal trends toward significance, the changes were not enough to create a significant effect. The results show that Surya Namaskar significantly influences the differences in Tear Break-Up Time (TBUT) between the right and left eyes, while other asanas do not, and this could indicate a potential role of Surya Namaskar in affecting tear film stability. More research is needed to establish the clinical significance of this finding.

Paired Samples Effect Sizes						
			Standardize	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Before Yoga TBUT Right Eye - Before Yoga TBUT Left Eye	Cohen's d	3.284	.005	-.246	.256
		Hedges' correction	3.304	.005	-.244	.254
Pair 2	Surya Namaskar Right Eye - Surya Namaskar Left Eye	Cohen's d	3.501	-2.070	-2.513	-1.620
		Hedges' correction	3.523	-2.057	-2.498	-1.610
Pair 3	Tadasana Right Eye - Tadasana Left Eye	Cohen's d	3.107	-.153	-.405	.100
		Hedges' correction	3.127	-.152	-.402	.099
Pair 4	Vriksasana Right Eye - Vriksasana Left Eye	Cohen's d	4.058	-.246	-.500	.009
		Hedges' correction	4.083	-.245	-.497	.009
Pair 5	Trikonasana Right Eye - Trikonasana Left Eye	Cohen's d	4.452	-.228	-.482	.027
		Hedges' correction	4.480	-.227	-.479	.027
Pair 6	Bhujangasana Right Eye - Bhujangasana Left Eye	Cohen's d	3.533	-.051	-.302	.200
		Hedges' correction	3.555	-.051	-.300	.199
Pair 7		Cohen's d	3.910	-.134	-.386	.118

	Virabhadrasana Right Eye - Virabhadrasana Left Eye	Hedges' correction	3.934	-.133	-.383	.118
Pair 8	Tulasana Right Eye - Tulasana Left Eye	Cohen's d	4.127	.159	-.094	.411
		Hedges' correction	4.153	.158	-.094	.408
Pair 9	Matsyadrasana Right Eye - Matsyadrasana Left Eye	Cohen's d	4.328	.015	-.236	.266
		Hedges' correction	4.355	.015	-.234	.264
Pair 10	Gaurdasana Right Eye - Gaurdasana Left Eye	Cohen's d	3.773	-.100	-.351	.152
		Hedges' correction	3.797	-.099	-.349	.151
a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.						

The paired samples effect sizes table provides Cohen's d and Hedges' correction, expressing the size of differences in tear break-up time (TBUT) between the left and right eyes before and after the performance of a range of yoga asanas. Cohen's d values of 0 reflect minimal effects, 0.2 to 0.5 reflect a small influence, and greater than 0.8 reflect a significant effect. The results show that Surya Namaskar had a strong effect (Cohen's d = -2.070, Hedges' = -2.057), suggesting a strong influence on TBUT differences between the right and left eyes. All of the other yoga asanas, however, like Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, and Garudasana, had small or even trivial effect sizes (Cohen's d values of -0.246 to 0.159), indicating a very small impact on tear film stability. The confidence intervals for these asanas include 0, thus supporting the finding that their effects are not statistically significant. In general, these results suggest that Surya Namaskar significantly influences TBUT differences between the right and left eyes, while the other asanas do not have a significant effect. Further studies may be needed to establish whether the effect of Surya Namaskar on TBUT has any clinical significance for eye health.

Hypothesis 4

- H0: There is no effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana on Before Yoga TBUT Right and Left Eye.
- H1: There is a significant effect of Gaomukhasana, Uttan padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, "Nadi Sodhan Prayanam, Kapalbhati, Meditation on Before Yoga TBUT Right and Left Eye.

Table 5: Hypothesis 4 test

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			

Pair 1	Before Yoga TBUT Left Eye - Before Yoga TBUT Right Eye	-.016	3.284	.420	-.857	.825	-.039	60	.969
Pair 2	Gomukhasana Right Eye - Gomukhasana Left Eye	.098	3.919	.502	-.905	1.102	.196	60	.845
Pair 3	Uttan Padasana Right Eye - Uttan Padasana Left Eye	.770	3.997	.512	-.253	1.794	1.505	60	.137
Pair 4	Bhramari Pranayam Right Eye - Bhramari Pranayam Left Eye	-.049	3.485	.446	-.942	.843	-.110	60	.913
Pair 5	Shitali Pranayam Right Eye - Shitali Pranayam Left Eye	-.492	4.403	.564	-1.619	.636	-.872	60	.386
Pair 6	Anulom- Vilom Pranayam Right Eye - Anulom-Vilom Pranayam Left Eye	.049	2.723	.349	-.648	.747	.141	60	.888
Pair 7	Nadi Shodhana Pranayam Right Eye - Nadi Shodhana Pranayam Left Eye	-.410	4.310	.552	-1.514	.694	-.743	60	.461
Pair 8	Kapalbhati Right Eye - Kapalbhati Left Eye	-.836	5.336	.683	-2.203	.531	-1.224	60	.226
Pair 9	Meditation Right Eye - Meditation Left Eye	-.705	3.809	.488	-1.681	.271	-1.445	60	.154

The paired samples test measures the effect of Gaomukhasana, Uttan Padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Shodhana Pranayam, Kapalbhati, and Meditation on right vs. left eye tear break-up time (TBUT) before and after performing the same. The results show that before yoga, there was no statistically significant difference in TBUT between the right and left eyes ($p = 0.969$), which means similar baseline tear stability in both eyes. Further, none of the yoga asanas or pranayama methods had statistically significant effects on TBUT variations since all p-values were greater than 0.05, with confidence intervals encompassing zero. Though Uttan Padasana ($p = 0.137$), Kapalbhati ($p = 0.226$), and Meditation ($p = 0.154$) had marginally higher

mean differences, they were still statistically non-significant. These findings point to the fact that the practice of yoga and pranayama does not have a considerable influence on differences in tear break-up time (TBUT) between the two eyes. While they potentially offer other health benefits, their effect on the stability of the tear film is questionable, requiring more research into any long-term ocular health impacts.

Paired Samples Effect Sizes						
			Standardize	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Before Yoga TBUT Left Eye - Before Yoga TBUT Right Eye	Cohen's d	3.284	-.005	-.256	.246
		Hedges' correction	3.304	-.005	-.254	.244
Pair 2	Gomukhasana Right Eye - Gomukhasana Left Eye	Cohen's d	3.919	.025	-.226	.276
		Hedges' correction	3.943	.025	-.225	.274
Pair 3	Uttan Padasana Right Eye - Uttan Padasana Left Eye	Cohen's d	3.997	.193	-.061	.445
		Hedges' correction	4.023	.192	-.061	.442
Pair 4	Bhramari Pranayam Right Eye - Bhramari Pranayam Left Eye	Cohen's d	3.485	-.014	-.265	.237
		Hedges' correction	3.507	-.014	-.263	.235
Pair 5	Shitali Pranayam Right Eye - Shitali Pranayam Left Eye	Cohen's d	4.403	-.112	-.363	.141
		Hedges' correction	4.431	-.111	-.361	.140
Pair 6	Anulom- Vilom Pranayam Right Eye - Anulom- Vilom Pranayam Left Eye	Cohen's d	2.723	.018	-.233	.269
		Hedges' correction	2.740	.018	-.232	.267
Pair 7	Nadi Shodhana Pranayam Right Eye - Nadi Shodhana Pranayam Left Eye	Cohen's d	4.310	-.095	-.346	.157
		Hedges' correction	4.338	-.094	-.344	.156
Pair 8	Kapalbhati Right Eye - Kapalbhati Left Eye	Cohen's d	5.336	-.157	-.409	.096
		Hedges' correction	5.370	-.156	-.406	.096
Pair 9	Meditation Right Eye - Meditation Left Eye	Cohen's d	3.809	-.185	-.437	.069
		Hedges' correction	3.833	-.184	-.435	.068

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

The paired samples effect sizes table shows Cohen's d and Hedges' correction to measure the size of differences in tear break-up time (TBUT) between the left and right eyes before and following the performance of Gaomukhasana, Uttan Padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-

Vilom Pranayam, Nadi Shodhana Pranayam, Kapalbhati, and Meditation. Cohen's d scores of 0 represent little effect, those from 0.2 to 0.5 represent a small effect, and those greater than 0.8 represent a strong effect. The results suggest that all effects are small or negligible, with Cohen's d scores ranging from -0.185 to 0.193, implying that the differences in TBUT between right and left eyes after these procedures were small. The confidence intervals for each pair include 0, indicating that the differences observed are likely due to random variation and not a significant effect. Uttan Padasana (Cohen's d = 0.193) had the greatest effect size, representing a small potential effect; however, it is still statistically insignificant. Kapalbhati (-0.157) and Meditation (-0.185) showed marginally negative effects, however, they are still in the insignificant range. The results confirm that none of the pranayama or yoga exercises had any significant impact on the TBUT differences between the right and left eyes, thereby validating the conclusion that they do not meaningfully affect tear film stability. Larger sample sizes or longer durations of intervention may be necessary to further examine possible long-term effects on ocular health.

Hypothesis 5

- H0: There is no effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana on Bp Systolic - Bp Diastolic.
- H1: There is a significant effect of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, Garudasana on Bp Systolic - Bp Diastolic.

Table 6: Hypothesis 5 test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Bp Systolic - Bp Diastolic	34.508	15.758	2.018	30.472	38.544	17.103	60	.000
Pair 2	Surya Namaskar Right Eye - Surya Namaskar Left Eye	-7.246	3.501	.448	-8.142	-6.349	-16.166	60	.000
Pair 3	Tadasana Right Eye - Tadasana Left Eye	-.475	3.107	.398	-1.271	.320	-1.195	60	.237
Pair 4	Vriksasana Right Eye - Vriksasana Left Eye	-1.000	4.058	.520	-2.039	.039	-1.925	60	.059
Pair 5	Trikonasana Right Eye -	-1.016	4.452	.570	-2.156	.124	-1.783	60	.080

	Trikonasana Left Eye								
Pair 6	Bhujangasana Right Eye - Bhujangasana Left Eye	-.180	3.533	.452	-1.085	.725	-.399	60	.692
Pair 7	Virabhadrasana Right Eye - Virabhadrasana Left Eye	-.525	3.910	.501	-1.526	.477	-1.048	60	.299
Pair 8	Tulasana Right Eye - Tulasana Left Eye	.656	4.127	.528	-.401	1.713	1.241	60	.219
Pair 9	Matsyadrasana Right Eye - Matsyadrasana Left Eye	.066	4.328	.554	-1.043	1.174	.118	60	.906
Pair 10	Gaurdasana Right Eye - Gaurdasana Left Eye	-.377	3.773	.483	-1.343	.589	-.780	60	.438

The paired samples test evaluates the impact of Surya Namaskar, Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, and Garudasana on the differences between systolic and diastolic blood pressure (BP). The findings show a difference that is highly significant for BP Systolic – BP Diastolic ($p < 0.001$) with a mean difference which is quite huge at 34.508 indicating the presence of impact variance of blood pressure level. Among the Asanas of yoga, Surya Namaskar had a significant difference between the right eye and left eye ($p < 0.001$) which was very outstanding, while all the other asanas including Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyadrasana, and Garudasana did not show many statistical significances ($p > 0.05$). Vriksasana ($p = 0.059$) and Trikonasana ($p = 0.080$) showed some weak evidence of no difference; nevertheless, these differences are not large enough to be conceivably important. From the results, one can conclude that there is a significant change in systolic and diastolic blood pressure; however, most yoga asanas except Surya Namaskar do not have much effect on the blood pressure changes. More research is needed to study the physiological reasons for these changes and their potential health benefits.

Paired Samples Effect Sizes						
			Standardize	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Bp Systolic - Bp Diastolic	Cohen's d	15.758	2.190	1.722	2.651
		Hedges' correction	15.858	2.176	1.712	2.635
Pair 2		Cohen's d	3.501	-2.070	-2.513	-1.620

	Surya Namaskar Right Eye - Surya Namaskar Left Eye	Hedges' correction	3.523	-2.057	-2.498	-1.610
Pair 3	Tadasana Right Eye - Tadasana Left Eye	Cohen's d	3.107	-.153	-.405	.100
		Hedges' correction	3.127	-.152	-.402	.099
Pair 4	Vriksasana Right Eye - Vriksasana Left Eye	Cohen's d	4.058	-.246	-.500	.009
		Hedges' correction	4.083	-.245	-.497	.009
Pair 5	Trikonasana Right Eye - Trikonasana Left Eye	Cohen's d	4.452	-.228	-.482	.027
		Hedges' correction	4.480	-.227	-.479	.027
Pair 6	Bhujangasana Right Eye - Bhujangasana Left Eye	Cohen's d	3.533	-.051	-.302	.200
		Hedges' correction	3.555	-.051	-.300	.199
Pair 7	Virabhadrasana Right Eye - Virabhadrasana Left Eye	Cohen's d	3.910	-.134	-.386	.118
		Hedges' correction	3.934	-.133	-.383	.118
Pair 8	Tulasana Right Eye - Tulasana Left Eye	Cohen's d	4.127	.159	-.094	.411
		Hedges' correction	4.153	.158	-.094	.408
Pair 9	Matsyadrasana Right Eye - Matsyadrasana Left Eye	Cohen's d	4.328	.015	-.236	.266
		Hedges' correction	4.355	.015	-.234	.264
Pair 10	Gaurdasana Right Eye - Gaurdasana Left Eye	Cohen's d	3.773	-.100	-.351	.152
		Hedges' correction	3.797	-.099	-.349	.151

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

The table of paired samples effect sizes shows Cohen's d and Hedges' correction that describe the differences in values of systolic diastolic blood pressure (BP) and the effect of various yoga asanas. A Cohen's d of 0.8 indicates a great effect, while near 0 indicates a small effect. The results demonstrate the gap between the systolic and diastolic blood pressure values had a great effect size (Cohen's d = 2.190, Hedges' = 2.176), which indicates the presence of a great difference. Surya Namaskar had a significant effect (Cohen's d = -2.070), which means it had a great impact. On the other hand, all other asanas Tadasana, Vriksasana, Trikonasana, Bhujangasana, Virabhadrasana, Tulasana, Matsyendrasana, Garudasana have small effect sizes (Cohen's d = -0.246 to 0.159) which tells they have slight impact. Their confidence intervals include zero, thus, proving their statistical insignificance. The results suggest these differences in systolic to diastolic blood pressure are very large with the difference being greatly influenced by Surya Namaskar and the other asanas having little to no impact on the differences in blood pressure. Further

research is needed to explore the underlying biological causes of these impacts.

Hypothesis: 6

- H0: There is no effect of Gaomukhasana, Uttan padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Sodhan Prayanam, Kapalbhati, Meditation on Bp Systolic - Bp Diastolic.
- H1: There is a significant effect of Gaomukhasana, Uttan padasana, Bhramari Pranayam, Shitali Pranayam, Anulom-Vilom Pranayam, Nadi Sodhan Prayanam, Kapalbhati, Meditation on Bp Systolic - Bp Diastolic.

Table 7: Hypothesis 6 test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Bp Systolic - Bp Diastolic	34.508	15.758	2.018	30.472	38.544	17.103	60	.000
Pair 2	Gomukhasana Right Eye - Gomukhasana Left Eye	.098	3.919	.502	-.905	1.102	.196	60	.845
Pair 3	Uttan Padasana Right Eye - Uttan Padasana Left Eye	.770	3.997	.512	-.253	1.794	1.505	60	.137
Pair 4	Bhramari Pranayam Right Eye - Bhramari Pranayam Left Eye	-.049	3.485	.446	-.942	.843	-.110	60	.913
Pair 5	Shitali Pranayam Right Eye - Shitali Pranayam Left Eye	-.492	4.403	.564	-1.619	.636	-.872	60	.386
Pair 6	Anulom- Vilom Pranayam Right Eye - Anulom-Vilom Pranayam Left Eye	.049	2.723	.349	-.648	.747	.141	60	.888
Pair 7	Nadi Shodhana Pranayam Right Eye - Nadi Shodhana	-.410	4.310	.552	-1.514	.694	-.743	60	.461

	Pranayam Left Eye								
Pair 8	Kapalbhati Right Eye - Kapalbhati Left Eye	-.836	5.336	.683	-2.203	.531	-1.224	60	.226
Pair 9	Meditation Right Eye - Meditation Left Eye	-.705	3.809	.488	-1.681	.271	-1.445	60	.154

The paired samples test evaluates the effect of Gaomukhasana, Uttan Padasana, Bhramari Pranayama, Shitali Pranayama, Anulom-Vilom Pranayama, Nadi Shodhana Pranayama, Kapalbhati and Meditation on the differences in blood pressure (BP) on the systolic and diastolic levels. The results show that there is a highly meaningful difference in systolic -diastolic blood pressure measurements ($p < 0.001$, mean difference =34.508), which leads to blood pressure fluctuation. Notwithstanding, none of the yoga asanas or pranayama techniques had any noteworthy effect on blood pressure variability as all p-values were greater than 0.05, with the confidence intervals including zero. Also, Uttan Padasana ($p = 0.137$), Kapalbhati ($p = 0.226$), and Meditation ($p = 0.154$) had slightly higher mean differences but remained statistically insignificant. This data demonstrates while there is a wide gap between systolic and diastolic blood pressure, the implemented yoga asanas and pranayama techniques did not have an adequate effect on blood pressure variability. Further studies could be helpful to assess their potential impacts on the control of blood pressure over a longer period.

Paired Samples Effect Sizes						
			Standardize	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Bp Systolic - Bp Diastolic	Cohen's d	15.758	2.190	1.722	2.651
		Hedges' correction	15.858	2.176	1.712	2.635
Pair 2	Gomukhasana Right Eye - Gomukhasana Left Eye	Cohen's d	3.919	.025	-.226	.276
		Hedges' correction	3.943	.025	-.225	.274
Pair 3	Uttan Padasana Right Eye - Uttan Padasana Left Eye	Cohen's d	3.997	.193	-.061	.445
		Hedges' correction	4.023	.192	-.061	.442
Pair 4	Bhramari Pranayam Right Eye - Bhramari Pranayam Left Eye	Cohen's d	3.485	-.014	-.265	.237
		Hedges' correction	3.507	-.014	-.263	.235
Pair 5	Shitali Pranayam Right Eye - Shitali Pranayam Left Eye	Cohen's d	4.403	-.112	-.363	.141
		Hedges' correction	4.431	-.111	-.361	.140
Pair 6		Cohen's d	2.723	.018	-.233	.269

	Anulom- Vilom Pranayam Right Eye - Anulom- Vilom Pranayam Left Eye	Hedges' correction	2.740	.018	-.232	.267
Pair 7	Nadi Shodhana Pranayam Right Eye - Nadi Shodhana Pranayam Left Eye	Cohen's d	4.310	-.095	-.346	.157
		Hedges' correction	4.338	-.094	-.344	.156
Pair 8	Kapalbhati Right Eye - Kapalbhati Left Eye	Cohen's d	5.336	-.157	-.409	.096
		Hedges' correction	5.370	-.156	-.406	.096
Pair 9	Meditation Right Eye - Meditation Left Eye	Cohen's d	3.809	-.185	-.437	.069
		Hedges' correction	3.833	-.184	-.435	.068
a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.						

This is the table of effect sizes d for paired samples described by Cohen and Hedges, which determines the magnitude of differences in systolic and diastolic blood pressure (BP) values due to different types of yoga asanas and pranayama techniques. As stated, Cohen's d has a value of 0.8 which would indicate a large effect, whereas values approaching zero indicate a minimal effect. The results show that the difference between systolic and diastolic blood pressure showed a large effect size (d= 2.190, Hedges' = 2.176) which then confirms between oscillation. However, none of the yoga asanas or pranayama techniques had a significant effect on blood pressure changes as all the d values were around zero (-0.185 to 0.193) which suggests no impact at all. All couples have zero as their confidence intervals, which is why it is so clear that there is no statistical significance. Asanas with lower impact sizes, even though dwarfing, had no distinction whatsoever statistically proven; these were Kapalbhati (-0.157) and Meditation (-0.185) which showed vague negative effects. The results highlight that although changes between systolic and diastolic blood pressure seem significant, the selected yoga asanas and the pranayama techniques do not significantly change blood pressure values. Additional studies using a bigger sample size and extended intervention duration may be required to investigate their potential long-term effects on blood pressure regulation.

Compare Before Yoga TBUT and after Yoga TBUT both Right and left eyes

Table 8: Compare between Before Yoga TBUT and after Yoga TBUT

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			

Pair 1	Before Yoga TBUT Right Eye - After Yoga TBUT Right Eye	.508	5.881	.753	-.998	2.014	.675	60	.502
Pair 2	Before Yoga TBUT Left Eye - After Yoga TBUT Left Eye	.475	6.169	.790	-1.104	2.055	.602	60	.549

The paired samples test evaluates the impact of yoga asanas on tear break-up time (TBUT) in the right and left eyes pre- and post-yoga practice. The data indicate there was no statistically significant change in TBUT for either eye, (p-values = 0.502 for the right eye; p-value = 0.549 for the left eye), both having results greater than the significance level of 0.05. The confidence intervals for both pairs also include 0, which furthers supports for no significant effect. The effect size calculations (Cohen's d and Hedges' correction) also support these results, as both effect sizes calculated near zero (Cohen's d = 0.086 for the right eye; Cohen's d = 0.077 for the left eye), indicating a small effect of yoga asanas having an impact on stability of TBUT. The results conclude that even though yoga may produce additional physiological benefits, there is no substantial effect of the yoga asanas on tear film stability when evaluating TBUT. Relating to the objectives of the study, the comparison of pre-and post-test TBUT scores showed that the yoga asanas did not create substantial changes in tear film stability. Future studies may need to increase the sample size and/or length of the intervention to explore potential long-term effects.

V. DISCUSSION

The research examined the contrasting effects of several postures and yoga breathing exercises on intraocular pressure and tear film stability. The study reveals that among the asanas studied, Surya Namaskar significantly affected intraocular pressure, resulting in a statistically significant difference between the right and left eyes. Since the above postures induced a head-down position, it is most likely that the rise in intraocular pressure in these postures was temporary. However, other postures such as Tadasana, Vriksasana, Bhujangasana, Virabhadrasana, and Matsyadrasana did not show any notable difference in intraocular pressure because they kept the heads either in a neutral position or balanced without head movement.

Increased IOP (IOP) increased moderately due to Trikonasana and Tulasana, especially when breath holding was made part of the Tulasana. Thus, it can be inferred that these postures, considering breath regulation and head tilts, can influence IOP. A Kapalbhati was observed to increase eye pressure due to forced expiration and equally high thoracic pressure compressing the ocular circulation. On the contrary, pranayama practices such as Bhramari, Shitali, Anulom-Vilom, and Nadi Shodhana Pranayama showed much less change or gradual reduction in intraocular pressure over time. These breathing techniques are mentioned in virtually all ancient texts for calming the nervous system, decreasing sympathetic overactivity, and enhancing oxygenation; this capability most probably cures ocular pressure in the long run.

Concerning Tear Break-up Time (TBUT), Surya Namaskar alone had a significant effect and all other asanas had nil or insignificant effects on TBUT. This implies that dynamic movement of both arms and legs into Surya Namaskar would affect the spread of the tear film, but static postures do not indicate any change. Another interesting thing is meditation shows a downward trend that can lower intraocular pressure, probably indicating its role in stress-associated ocular pressure fluctuations. However, this aspect could not attain significance that

warrants it to be put under the head of further research.

This study evaluated the effect of yoga on blood pressure ebb and flow, both systolic and diastolic. Surya Namaskar alone was very effective, with none of the others or pranayama techniques having any effect. It appears, then, in agreement, that the dynamic Surya Namaskar affects lived reality states physiologically while any static or symmetrical postures are without any effect.

Trikonasana and Tulasana therefore did mildly increase pressure in the eye, more so with breath holding as in Tulasana, suggesting that poses with breath regulation, and tilting of the head can indeed influence intraocular pressure (IOP). The pressure inside the eyeball was also elevated during Kapalbhati due to forced breathing out and high thoracic pressure compressing on ocular circulation. In contrast, pranayama techniques like Bhramari, Shitali, Anulom-Vilom, and Nadi Shodhana Pranayama caused little to no change or a gradual decrease in intraocular pressure with time. These exercises are very well documented to calm the nervous system, reduce sympathetic overactivity, and cause oxygenation, which may heal ocular pressure in the long run.

Regarding the tear film stability, it was only Surya Namaskar that had an impact, while all other asanas had insignificant or no effect on Tear Break-Up Time (TBUT). This implies that the dynamic movement of both arms and legs into Surya Namaskar would influence the spread of the tear film, but static postures do not show such a change. Also, meditation appeared to trend toward lowering IOP, thereby supporting its possible role in stress-associated fluctuations of ocular pressure. However, this could not reach statistical significance for this observation and warrants further study.

VI. CONCLUSION

Results show that particular yoga practices affect intraocular pressure, tear film stability, and blood pressure, and Surya Namaskar had the most significant impact among all methods studied. The study stated that asanas with inverted postures and breath retention temporarily elevate intraocular pressures while well-regulated breathing practices like pranayama can be beneficial for long-term steady states of such pressures. Findings illuminated quite a lot of inconsequential data regarding tear film stability other than Surya Namaskar, which happened to demonstrate a significant impact. Likewise, overall variations in blood pressure were significant, with only Surya Namaskar managing to show a marked effect. These insights encourage further research on therapeutic applications of yoga in ocular and cardiovascular health while underscoring the need for more such studies with large sample sizes to confirm these findings conclusively.

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