Effect of *Trataka* (Yogic Visual Practices) on Reducing Visual Strain and Improving Concentration in Adults using Tele-*Yoga*

By

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Rajni Garg

STANDARD INTERNATIONAL TRANSLITERATION CODE USED TO TRANSLITERATE SANSKRIT WORDS

a	**=**	**A**	**ìa**	**=**	**'**	**pa**	**=**	**p**
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é	**=**	**$**	**ja**	**=**	**j**	**bha**	**=**	**É**
u	**=**	**%**	**jha**	**=**	**H**	**ma**	**=**	**m**
ü	**=**	**^**	**ï**	**=**	**|**	**ya**	**=**	**y**
å	**=**	\	**öa**	**=**	**q**	**ra**	**=**	**r**
è	**=**	§	**öha**	**=**	**Q**	**la**	**=**	**l**
e	**=**	**@**	**òa**	**=**	**f**	**va**	**=**	**v**
ai	**=**	**@e**	**òha**	**=**	**F**	**ça**	**=**	**z**
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Table of Content

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ABSTRACT

Visual strain, fatigue and cognitive behavior related issues are on the rise with the increasing use of digital media (computer, cell phone, and TV). Excess use of smart devices has been correlated to increased mind-wandering, depression, and anxiety which leads to decrease in concentration. The present research was undertaken to study the impact of *Trataka yogic* visual practices on reducing visual strain and improving concentration in adult population.

62 participants in the age range 24-75 years (mean age 48.27 years) participated in this study (experimental group (n=43) and control group (n=19)). Within-subject repeated measure pre-post study design was used for this study. Experimental group participants took part in the *Trataka* intervention session for two weeks excluding Saturday and Sunday . These sessions were conducted online for 30 minutes each day as per the protocol. Participants in both the groups completed two assessment tools "Visual Strain and Fatigue Symptom Checklist (VSC) and Mind Wandering Questionnaire (MWQ)" before (baseline/pre) and after *yoga* intervention (post).

Statistical analysis of 'Within-group' pre- and post- intervention data showed significant results (MWQ post $p<0.001$; VSC post $p=0.002$). Between-group analysis also showed VSC post data to be significant ($p=0.035$). Effect size of post value (MWQ=0.28, VSC=0.33) indicated some difference in the pre and post results. Some marginal changes in these scores were also noted at the baseline (pre-intervention), but their magnitude was very small.

The results of this study provide scientific evidence that *Trataka* (*yogic* visual practices) could help reduce visual strain and improve concentration. The novelty of this research is that the results suggest tele-*yoga* sessions are as effective as in-person sessions in making *Trataka*, a relatively less studied *yoga* technique, accessible to participants in remote areas.

Participants self-reported comments and testimonials provide evidence for achieving several secondary positive outcomes of this study such as reduced stress, better sleep, increased focus, and a relaxed state of mind and body. In future, similar studies can be undertaken for a wider population to further understand the effect of *Trataka* intervention as an alternate therapy in reducing vision related issues and improving cognitive functions using tele-yoga.

CHAPTER 1
INTRODUCTION

With the advancement of age and increasing use of digital media (such as computer, cell phone and TVs), most people often suffer from eye problems including vision strain and cognitive behavior related issues (Kumar et al., 2022; Sherlee and David, 2020; Saoji et al., 2022; Telles et al., 2006). Sensitivity to light, ocular fatigue, blurry vision, headache, all are symptoms of **visual strain** (John et al., 2018). Excessive improper prolonged use of digital media has been reported to cause several eye issues (Gowrisankaran et al., 2015). Use of smartphones has been correlated with visual fatigue (Kim et al., 2017). Musculoskeletal pain and psychosocial problems have been reported with increased use of smart devices (Hales et al., 1994). Decreased performance and psychosocial well-being are negatively impacted by excessive use of smartphones (Van Den Eijinden et al., 2018).

Too much exposure to digital media and smart phones increases **mind-wandering** (Markowitz 2019). Increase in depression and negative moods have been linked to mind-wandering (Smallwood et al., 2009). Performance and **concentration of an individual is affected by mind-wandering** as indicated by research (Desideri et al., 2019). An interconnectedness between stress, anxiety and mind-wandering has been noticed affecting various cognitive functions (Boals et al., 2020).

In this era of information explosion and telecommunication, it is not possible to avoid use of digital media and reduce exposure of digital display screens. However, it is possible to design strategies and alternate therapies to reduce visual discomfort and enhance cognitive functions. A recent review suggested a few strategies such as use color filters, use of lubricant eye drops, blinking frequently in between digital use, and eye exercises (Coles-Brennan et al., 2019).

Multidisciplinary mind-body ***yoga*** practices are increasingly being used as non-pharmacological intervention to address various health issues (Field, 2016). An emerging area in *yoga* therapy research is to study the impact of *yoga* practices on brain health, vision, and cognitive behavior changes such as memory, concentration, attention, and mindfulness (Gothe et al., 2019). In one study, visual discomfort was found to be reduced after *yoga* intervention (Telles et al., 2006). Another study reported a decreased eye fatigue score after doing *yogic* eye practices (Kim et al., 2016). Mindful *yogic* practices have been correlated to increase attention and reduced anxiety and mind-wandering (Saoji et al., 2018). Breathing and meditation-based *yoga* practices can be effective tools to reduce mind-wandering and improve other cognitive functions. These studies indicate that *yoga* practices can help manage the increased visual strain and mind-wandering.

Trataka (*yogic* visual practice), described in ancient *yogic* texts, helps reduce fatigue, sleep

disorders, and eye problems (Muktibodhananda, 1999). In *Trataka* practice, a person gazes steadily on an object (candle flame, thumb/index finger, or an image) without blinking till tears roll down the eyes. *Trataka* practice has been reported to provide manifold health benefits: physical (vision related improvement), therapeutic (reducing tension, anxiety, depression, and insomnia), and spiritual (memory and concentration improvement, and strong will power); it is also an excellent preparatory practice for meditation (Raghuram and Nagendra, 2006; Nagarathna and Nagendra, 2011; Swathi et al., 2020).

Tele-*yoga*: Use of tele-*yoga* has been popular in the past few years globally (Selman et al., 2015). The Covid-19 pandemic has escalated the use of tele-*yoga* (Jasti et al., 2020). Participants are finding the use of tele-*yoga* convenient and effective as it allows them to participate from their home in remote locations. It's specifically convenient for people with limited mobility and working professionals. Increasingly, it is being considered an appropriate and effective intervention method in *yoga* science research (Mathersul et al., 2018). One recent study used tele-*yoga* to study the effect of *Trataka* and *Pranayama* (Vasan, 2022).

All these studies provide scientific evidence of the benefits of *Trataka* to reduce visual strain and mind-wandering. An in-depth study of scientific literature reveals that there is still a great need for more evidence based scientific studies on the use of *Trataka yogic* practices and its effect on visual strain and concentration. Further, the effectiveness of online tele-*yoga* sessions needs to be evaluated by more scientific studies. Therefore, this research was conducted to understand the role of *Trataka yoga* in reducing the visual strain and improving the concentration in adults using tele-*yoga*. The results of this study presented in this thesis provide further scientific evidence regarding the effectiveness of *Trataka yogic* visual practices conducted online (tele-*yoga*) to help reduce visual strain and improve concentration.

CHAPTER 2
LITERATURE REVIEW

2.1 Ancient Literature Review

What is *Yoga*: The word *Yoga* is defined as, "*Yujuate anena itih Yogah*," meaning *Yoga* is that which joins (unites) the conscious mind (*Jivatma* or Individual Self) with the subconscious mind (*Parmatama* or Universal Self). *Yoga* helps in the all-round personality development of a person (Nagarathna and Nagendra, 2011).

Yoga practices promote positive health and help in the treatment of psychosomatic and psychiatric problems. A significant amount of research is being carried out to understand the benefits of *yoga* (Raghuram and Nagendra, 2006).

Definitions of *Yoga*: *Patanjali*'s *Ashtanga Yoga* was given about 4000 years ago in the form of '*Sutras*' and has contributed greatly to *Yoga* science (Nagarathna and Nagendra, 2011). Several definitions of *Yoga* have been given in ancient scriptures (Nagendra, 2008). A few are given below.

Patanjali defined *Yoga* as, "*Yogah Citta Vritti Nirodah (yoga* is a conscious process of mastery over the mind)." *Vasistha* states, "*Manah Prasamanopayah Yoga Ityabhidhiyate (yoga* is a subtle trick to calm down the mind)." *Bhagvad Gita* defines it as, "*Yogah Karmasu Kausalam* (*yoga* is dexterity in action)." Another definition of y*oga* as per *Bhagvad Gita* is. "*Samatvam Yogah Ucyate (Yoga* is to maintain equanimity in success or failure, happiness or sadness or other contrasting situations)." *Sri Aurobindo* said, "*Yoga* is a methodical effort towards self-perfection by developing the latent faculties hidden in an individual." It helps in the all-round personality development of a person.

All these definitions of *Yoga* integrate well with the World Health Organization definition of health, "***Health is a state of complete physical, mental, social, and spiritual well-being and not merely an absence of disease or infirmity.***"

The Science of Illness as per Ancient *Yoga* Text: Sage *Vasistha* described the science of illness in ancient text *Yoga Vasistha*. According to him all diseases (*Vyadhis) can be divided into two parts*: *Adhija* and *Anadhija*. Modern day stress-related psychosomatic diseases are called *Adhija Vyadhi*. Non-stress related diseases are called *Anadhija Vyadhis. Yoga* plays important role in treating stress-related diseases (Nagrathna and Nagendra, 2011).

Ancient *Yoga* texts also suggest the five-layer existence of a human being (*Panca Kosa*). Innermost to outermost layers are known as: *Annamaya (physical), Pranamaya (pranic), Manomaya (mental), Vijnanamaya (knowledge)* and *Anandamaya (bliss) layers*. Disturbances in these layers over time result in imbalances called *Adhis*. These ultimately affect the flow of breathing and disturb the *prana*, eventually causing physical illnesses/diseases (*vyadhis*). The concept of *Panca Kosa* and how this concept has been used for developing Integrated Approach of *Yoga* Therapy is discussed in detail (Raghuram and Nagendra, 2006).

Ancient *yoga* text suggests multifold approach of *yoga* therapy to address various physical and mental issues. This approach includes an integration of various practices - moral code of conduct (*Yama*), ethical code of conduct (*Niyama)*, physical practices *(Asana*), controlled breathing *(Pranayama*), *Dharana* and *Dhyana* (meditation), and cleansing practices *(Kriyas*) (Muktibodhananda, 1999).

Kriyas (Cleansing *yogic* practices): Six *yogic* cleansing practices called *Shatkarma* are discussed in Hath *Yoga* Pradipika (HYP) as given below (Muktibodhananda, 1999).

"dhautirbastistathā netistrāṭakaṃ naulikaṃ tathā |
kapāla-bhātiśchaitāni ṣha-karmāṇi prachakṣhate || HYP 2.32 ||"

"The six categories of cleansing techniques are *Dhauti, Basti, Neti, Trataka, Nauli, and Kapâla Bhâti.*"

"karma ṣhaṭkamidaṃ ghopyaṃ ghaṭa-śodhana-kārakam |
vichitra-ghuṇa-sandhāya pūjyate yoghi-pungghavaiḥ || HYP 2.33 ||"

"These cleansing actions should be kept under wraps. They produce exceptional qualities when carried out sincerely by the best *Yogîs.*"

These *yogic* kriyas have been found useful in cleansing inner tracts in our body (such as optical, nasal, respiratory, GIT) and removing tardiness/laziness. They help develop an inner awareness, desensitize hypersensitive pathways in our body, and build stamina (Muktibodhananda, 1999).

Importance of *Trataka*: Among these six practices, *Trataka yogic* kriya provides manifold benefits: physical benefits such as vision related improvement, therapeutic benefits such as reducing the anxiety, depression, and insomnia; and spiritual benefits such as improving concentration, memory, and will power. It is also considered an excellent preparation for starting meditation (Raghuram and Nagendra, 2006).

In *Trataka* practice, a person gazes steadily on an object (candle flame, thumb/index finger, or

an image) without blinking till tears roll down the eyes. **Contraindications of *Trataka*:** People suffering with glaucoma, cataract, error of refraction should avoid *Trataka* practice. An epileptic person should avoid practicing *Trataka* on a flickering candle flame, they may however use a steady object to gaze. People with insomnia should avoid practicing at night. People with tension headaches should avoid this practice.

Several research studies have been conducted to provide scientific evidence of these benefits. Results of these studies along with their references are summarized in scientific literature section 2.2 of this report.

2.2 Scientific Literature Review

This section summarizes the results of scientific literature published using *Trataka yogic* practices to address vision related issues and psychological well-being.

Saoji et al., (2022) did a randomized controlled trial (RCT) study using *Trataka* (20 minutes/day for 6 days/week for total of two weeks) to study its effect on visual strain, fatigue, and mind-wandering. Assessments used were "Mind-Wandering Questionnaire (MWQ), State Mindfulness Attention Awareness Scale (SMAAS), Visual Fatigue Scale (VFS), and Visual Symptoms Checklist (VSC) tools." Reduction in MWQ, VFS and VSC scores, and improvement in the SMAAS score was reported. It was concluded that the, "*Trataka* practice can help improve the state of mindfulness and reduce the visual strain due to excessive use of digital media."

Vasan et al., (2022) studied the effect of *Trataka* and *Pranayama* using tele-*yoga* on adolescents exposed to digital display. They used pre-post study with a sample size of 59. The assessments used were, "Visual Strain Surveys (VSS), Digit Letter Substitution Test (DLST), Six Letter Cancellation Test (SLCT), and State Trait Anxiety (STA)." Statistically significant reductions were reported in the VSS scores. STA score of positive sentiments improved. Concentration related scores (DLST and SLCT) did not improve much. This research study concluded that the use of *Trataka* and breathing practices can help reduce vision strain and anxiety in adolescents using digital media a lot.

Swathi et al., (2021) reported a study on a sample size of 41 (age range 20- 26 years). They used repeated measure pre-post study design. Participants performed *Trataka* (20 minutes per day for 2 weeks). The assessment tool used was Cori Block Tapping Task (CBTT). Significant improvement in CBTT scores were reported for within-subjects' effects. This study concluded that the *Trataka* practice helps improve working and spatial memory, and spatial attention of the participants.

Swathi et al., (2020) reviewed literature highlighting benefits of *Trataka* and other *Shatkarma kriyas* (six *yogic* cleansing techniques). They concluded that the *Trataka* and other *yogic* cleansing techniques improve psychological, physical, and spiritual health of participants.

Shathirapathiy et al., (2020) used *Trataka* to study its effect on sleep disorder and insomnia. They used a sample size of 29 to do *Trataka* (45 minutes each day for 10 days). "The Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI)" assessments were measured using pre-post design. ISI and PSQI global scores reduced significantly after *Trataka* practice in participants suffering from Insomnia and sleeplessness problems. The authors concluded, "*Trataka* practice can help reduce severity of insomnia and improve quality of sleep-in people suffering from insomnia".

Sherlee & David, (2020) performed "true experimental study-design" to study *Trataka* practice effect on anxiety and cognitive performance of adolescents. They used, "Stroop color-word test and Hamilton anxiety scale" as assessment tools. A significant improvement in the scores of the Stroop test was reported for the study group. Cognitive performance was also found related to background variables such as parent's occupation, gender etc. of the study group. Authors concluded that the *Trataka* practice is effective in improving the cognitive performance and anxiety of adolescents. Control group data did not show any change.

Tiwari et al., (2018) used randomized control trial to compare the effect of *Trataka* and Bates eye exercise in reducing myopia. They did their study for 8 weeks on a sample size of 24. No statistically significant improvement was noticed in improving vision strain and refractive errors. This study concluded that both form of eye practices, "Bates eye exercises and *Trataka,"* are not very effective treatments in case of Myopia.

Raghavendra and Singh, (2016) used self- controlled study design and did pre-post assessment on a sample size of 30 male adults (age range 18-31 years). The assessment tool was the "Stroop color-word test". Improvement was reported in the cognitive behavior of participants after *Trataka* practice whereas the control group did not show any positive change. The authors concluded, " *yoga* intervention improved the cognitive performance of participants such as selective attention and cognitive flexibility improved after *Trataka*., and response inhibition."

Talwadkar et al., (2014) conducted a randomized control trial (RCT) for 26 days. They divided the whole population of 60 elderly adults into two groups - *Trataka* and waitlist control group. The assessment tools used were "Digit Span Test (DST), Six Letter Cancellation Test (SLCT), and Trail Making Test- B (TMT-B)." A significant improvement in DST scores was noticed after one month of *Trataka* practice. TMT-B and SLCT scores also improved after the intervention compared to the baseline. This research proved that the *Trataka yogic* practice can be effectively used as a nonpharmacological intervention to improve cognitive functions in elderly people.

Mallick and Kulkarni, 2010, studied *Trataka*'s effect on a sample size of 30 adults (age range 25-40 yrs.). Pre and post assessment was done using Critical Flicker Fusion (CFF) tool. A significant increase in CFF score was reported immediately after the *Trataka* intervention.

The above discussion highlights the importance of *Trataka* eye *yoga* practices in alleviating visual strain, fatigue, and psychological well-being. Increasingly, *Trataka* is being considered an appropriate and effective intervention method in *yoga* science research.

CHAPTER 3
AIMS AND OBJECTIVES

3.1 Aim

To design and study a *yoga* module to understand the effect of *Trataka* (yogic visual practice) in reducing visual strain and improving concentration in adults using tele-*yoga*.

3.2 Objectives

Trataka is a *yogic* visual practice which involves a set of simple eye exercises with breathing and intense focusing/defocusing on an object. These practices exercise the eye muscles involved in focusing, concentration and relaxation. The objective of this study is to see if the regular practice of *Trataka* will help reduce visual strain and improve concentration.

3.3 Research Question

Does *Trataka*, a *yogic* visual practice, help reduce vision strain and improve concentration of adults participating in this study?

3.4 Hypothesis

Trataka (*yogic* visual practices) will help reduce visual strain and improve concentration.

3.5 Null Hypothesis

Trataka (*yogic* visual practices) does not have any association with visual strain and concentration.

3.6 Ethical Consideration

There is no known harmful physical or psychological effect of *yoga* practices used in this study. All participants submitted an online informed consent form in English indicating that they are participating in this study voluntarily. They could opt out from the study anytime. Confidentiality of the data was maintained by removing all personal information such as name, email, and phone number after data collection and assigning a unique identity number. All questionnaires were administered online using google form and data was stored securely by the researcher.

CHAPTER 4
METHODOLOGY

4.1 Participants

Healthy adults aged 21 and over mostly from the Indian Diaspora were enrolled for this study from different geographical locations in USA for tele-*yoga* via different mailing and WhatsApp groups.

4.2 Inclusion Criteria

Adults, both genders, who were physically and mentally healthy with no serious illness, willing to sign informed consent, complete survey questionnaire, available for two weeks for tele-yoga, and not doing any form of eye *yoga* practices were included in this study.

4.3 Exclusion Criteria

Participants who were not healthy (had glaucoma, error of refraction, cataract, epilepsy, tension headache), not willing to sign informed consent, not willing to complete questionnaire, not available for two weeks *yoga* sessions online, were excluded from this study.

4.4 Sample Size

Initially 91 participants registered for the study. After the study design was explained to them, 62 participants committed fully to the study and signed the consent form. Out of 62 participants, 22 were male, 40 were female. The participants' age range was 24-75 years with a mean age of 48.27 years.

4.5 Experimental and Control Groups

These 62 participants were divided into two groups – Experimental Group (n=43) and Control Group (n=19) as per their choice. Few other research studies have used similar sample sizes (Gopinathan et al., 2012; Talwadkar et al., 2014). *Note:* Due to practical limitations and remote online *yoga* intervention sessions, random selection of participants in the two groups was not possible. Participants were allowed to self-select their groups and most of the participants chose to stay in experimental groups.

4.6 Study Design

'Within-subject' repeated measure pre-post study design was used in this study. Participants were divided into two groups, experimental and control. This study design allowed only pre- and post-comparisons between groups. ***Study Constraints:*** Most of the participants were from Indian diaspora. Due to practical limitations and remote online *yoga* intervention sessions, participants were allowed to self-select their group. These factors have the possibility of introducing some bias in the study precluding the generalization of the results to a wider population.

4.7 Intervention

4.7.1 Protocol

A 30-minute *Trataka yoga* intervention module was designed and executed online via Zoom for two weeks (10-sessions excluding Saturday and Sunday). Two sessions' timings were offered morning and evening to facilitate maximum participation, as many of the participants were not available at one given time. Participants were given the choice to join any one of the sessions but were asked to stay with their respective group for the duration of study. ***In this study, participants used their own thumb or index finger as a reference point to focus their gaze and move eyeballs during the Trataka practice. This variation of Trataka is known as Jatru Trataka*** (Muktibodhananda, 1999). Recently, one research study has used this method to study the impact of *Trataka* on adolescents exposed to prolonged digital display (Vasan et al., 2022). ***Protocol*** included following components discussed below (Protocol attached in Appendix 1).

1. **Instructions/ Opening** – Silence, breath awareness, 3 *Om* (3 minutes)

2. **Preparatory Simple Eye Practices** (7 minutes)

    - Blinking of eyes
    - Relaxed movement of both eyeballs in the following directions - horizontal, vertical, diagonal, clockwise, and anticlockwise
    - Each of the above listed movements was followed by simple palming (rubbing both the palms, generating warmth, and cupping the eyes without touching the eyeballs)

3. ***Trataka* practices** (14 minutes)

- **Focusing**: Movement of both the eyeballs focusing on the thumb nail of one hand held straight at shoulder level as a reference point in the following directions - *Vamu* (left), *Dakshina* (right), *Urdhwamukha* (up), *Adhomukha* (down), clockwise, and anti-clockwise. Each of these practices was followed by ***simple palming*** (rubbing both the palms, generating warmth, and cupping the eyes without touching the eyeballs).

- **Intense Focusing**: Movement of both the eyeballs focusing on the tip of the index finger of one hand held straight at shoulder level as a reference point in the following directions - *Bhrumadya* (center between eyebrows), and *Nasikagraha* (tip of nose). Each of these practices was followed by ***press (inhale)-n-release (exhale) palming*** (rubbing both the palms, generating warmth, and cupping the eyes without touching the eyeballs).

- **Intense Focusing and Defocusing**: Movement of the eyeballs focusing on the thumb nail of both the hands held straight at shoulder level as a reference point. Moving the right hand in right direction and left hand in left direction - *Ubhaya* (both) *Jatru Trataka*. This practice was followed by ***constant palming with Bhramari (bee sound) chanting***.

4. **A-U-M chanting** (2 minutes)

5. **Relaxation** (2 minutes) – Deep abdominal breathing

6. **Closing** – *3 Om* and silence (2 minutes)

Note: All participants were asked to sit comfortably in a well-lit room and keep their eyes open during the practice except while palming. They were encouraged to do abdominal diaphragmatic breathing throughout the practice.

4.7.2 Experimental Group

Experimental group participants joined online *yoga* sessions via Zoom for two weeks. They were asked to sit comfortably and follow the guided *Trataka* practice for 30 minutes as given in protocol (See Appendix 1). Participants were asked to keep their screen video on, keep the sessions free from interruptions, maintain silence and fully attend the 30-minute session each day. Daily attendance was taken and recorded on a spread sheet. All participants completed the assessments tools given online via a google form on day 1 before the intervention started (baseline/pre assessment) and on the last day after completing two weeks of *yoga* intervention (post assessment).

4.7.3 Control Group

Control group participants did not attend any *yoga* session. They were asked to complete assessments on day 1 before the start of intervention (pre assessment) and continue their routine activities for two weeks. After two weeks this group was also asked to complete the assessment forms on the last day (post assessment).

4.8 Assessment Tools

Impact of *Trataka* intervention was assessed using two self-reported assessment tools: (1) Visual Strain and Fatigue Symptoms Checklist (VSC); and (2) Mind-Wandering Questionnaire (MWQ). Both tools have been used in recent research studies to assess the impact of *Trataka* intervention for visual strain and cognitive behavior changes (Saoji et al., 2021, Swathi et al., 2020, Vasan et al., 2022).

4.8.1. Visual Strain and Fatigue Symptom Checklist (VSC)

VSC is a specially designed assessment tool used to measure visual strain and fatigue (Saoji et al., 2022; Vasan et al., 2022). It consists of 14 questions checking for different symptoms as an indicator of visual strain and fatigue. These symptoms are, “dry eye, tired eye, sore/aching eye, irritated eye, itchy eye, watery eye, burning eye, eye strain, blurred vision, difficulty in focusing, visual discomfort, headache, heaviness of head, nausea, and vomiting.”

Each symptom is assessed for severity using a Likert scale of severity on a scale of 1-5, “1-never, 2-rarely, 3-occasionally, 4-often, 5-nearly always.” An average of all scores is calculated and reported. *A low scale indicates symptoms are less severe* (sample VSC scale is attached in Appendix 2).

4.8.2 Mind Wandering Questionnaire (MWQ)

MWQ is a reliable and validated tool to measure mind-wandering, psychological well-being including concentration (Mrazek et al., 2013, Saoji et al., 2022). MWQ consists of a five-item self-rated questionnaire measuring different symptoms of mind-wandering. These items are listed below.

- Item1 - I have difficulty maintaining focus on simple or repetitive work.
- Item 2 - While reading, I find I haven't been thinking about the test and must therefore read it again.
- Item 3 - I do things without paying full attention.

- Item 4 - I find myself listening with one ear, thinking about something else at the same time.
- item 5 - I mind-wander during lectures of presentations.

Responses are assessed for severity using a Likert scale of severity on a scale of 1-6, “1-very rarely, 2-very infrequently, 3-somewhat infrequently, 4-somewhat frequently, 5-very frequently, 6-almost always.” An average of all scores is calculated and reported. *A low scale indicates response is less severe* (sample MWQ scale is attached in Appendix 3).

CHAPTER 5
DATA ANALYSIS AND RESULTS

5.1 Data Collection

VSC and MWQ questionnaires were used to create a google form. Participants were requested to sit comfortably in a well-lit room and relax for 5 minutes before taking assessments. Both the groups (experimental and control) completed MWQ and VSC assessment forms on day 1 before the intervention started (pre or baseline) and after completion of two weeks of *yoga* intervention (post) (data attached in Appendix 4). Participants attendance was noted down in an excel sheet for compliance. Experimental group participants were asked to provide voluntary comments/feedback/testimonials to qualitatively assess any change they noted which was not covered by questionnaire (These comments are attached in Appendix 5).

5.2 Data Analysis

All data was extracted and organized in Microsoft Excel using Microsoft office 365. Analysis of the data was done using JASP statistical software version 0.14.1 (JASP, 2020). Shapiro Wilk's test was used to find normality, it showed that the data is not normally distributed. Thus, a non-parametric Wilcoxen Paired Rank test was used for studying 'within-group' effects; and Mann-Whitney U test for 'between-group' analysis. A recent research study has used similar tests to study the effect of *Trataka* on psychological well-being of adults (Saoji et al., 2022). This supports our approach to data analysis for this study. Tables 1-3 and Figures 1-9 show the key results of the analysis. Table 1 provides a summary of results. Table 2 provides MWQ pre and post score for each of the 5-items in the MWQ scale. Table 3 gives VSC pre and post score for each of the 14 symptoms in the VSC scale.

5.3 Demography Data Analysis

62 participants with the age range 24-75 years (mean age 48.27 years) participated in this study. The experimental group (n=43) has 12 male and 31 female participants whereas the control group (n=19) has 10 male and 9 female participants. Figures 1-3 show results of demographic analysis of experimental group participants.

5.4 Within Group Analysis

MWQ and VFS data were analyzed to find out if any change has taken place post intervention

within the same group (results summarized in summary Table 1). The MWQ post value of experimental group participants reduced significantly (**p<0.001**). The VSC post value of experimental group also reduced significantly (**p=0.002**). Some marginal changes in these scores were also noted for control group but they were not significant.

5.5 Between Group Analysis

Although the study design was 'within-group', we also analyzed 'between-group' data to study effects between groups. Results given in Table 1 show VSC post data to be significant (**p=0.035**). Although MWQ post data p-value was statistically not significant (**p=0.072**), but effect size of post value (MWQ=0.28, VSC=0.33) indicates some difference in the pre and post results. Marginal differences were noticed at baseline (pre-intervention) for both MWQ and VSC, but their magnitude was very small (Table 1).

Table 1. Results Summary

Dependent Variables	Experimental (n=43)			Control (n=19)			Between group p-values		Effect Size
	Pre	Post	p-value	Pre	Post	p-value	Pre	Post	Between groups post values
MWQ	2.86 (1.14)	2.19 (0.92)***	**<0.001**	2.84 (1.06)	2.68 (1.09)	0.656	0.842	0.072	0.28
VSC	1.85 (0.54)	1.60 (0.52)**	**0.002**	1.85 (0.46)	1.98 (0.67)	0.492	0.909	**0.035**	0.33

Note: "Within group changes compared using Wilcoxon paired rank test; between group changes compared using Mann Whitney U test; Effect size reported for between group changes for the post values. * = $p<0.05$, **= $p<0.01$, *** = $p<0.001$."

Table 2. MWQ Item-Wise Pre and Post Mean

MWQ Items 1-5	Pre-Exp	Post-Exp	Pre-Control	Post-Control
Item 1, "I have difficulty maintaining focus on simple or repetitive work"	2.74	2.12	2.63	2.42
Item 2, "While reading, I find I haven't been thinking about the test and must therefore read it again"	3.00	2.26	2.74	2.79
Item 3, "I do things without paying full attention"	2.56	2.23	2.68	2.53
Item 4, "I find myself listening with one ear, thinking about something else at the same time"	**2.95**	**2.12**	2.95	2.79
Item 5, "I mind-wander during lectures of presentations"	3.05	2.23	3.26	3.11
MWQ Total Mean	**2.86**	**2.19**	**2.84**	**2.68**

Table 3. VSC Symptom-Wise Pre and Post Mean

VSC Symptoms 1-14	Pre-Exp	Post-Exp	Pre-Control	Post-Control
1-Dry Eye	2.09	1.63	1.95	2.05
2-Tired Eye	2.35	1.58	2.58	2.47
3-Sore Eye	1.72	1.49	1.63	0.00
4-Irritated Eye	1.81	1.51	1.68	2.11
5-Watery Eye	1.74	1.70	1.63	1.95
6-Burning Eye	1.77	1.35	1.37	1.68
7-Eye Strain	**2.26**	**1.65**	2.16	2.11
8-Blurred Vision	1.88	1.49	1.63	1.84
9-Difficulty Focus	1.98	1.58	1.95	1.74
10-Visual Discomfort	1.70	1.37	1.68	1.79
11-Headache	1.77	1.40	1.74	1.74
12-Heaviness Head	1.67	1.49	1.89	1.79
13-Nausea	1.16	1.09	1.37	1.47
14-Vomiting	1.16	1.05	1.21	1.32
VSC Total Mean	**1.85**	**1.60**	**1.85**	**1.98**

Figure 1 below shows the age (years)-wise distribution of participants in the experimental group.

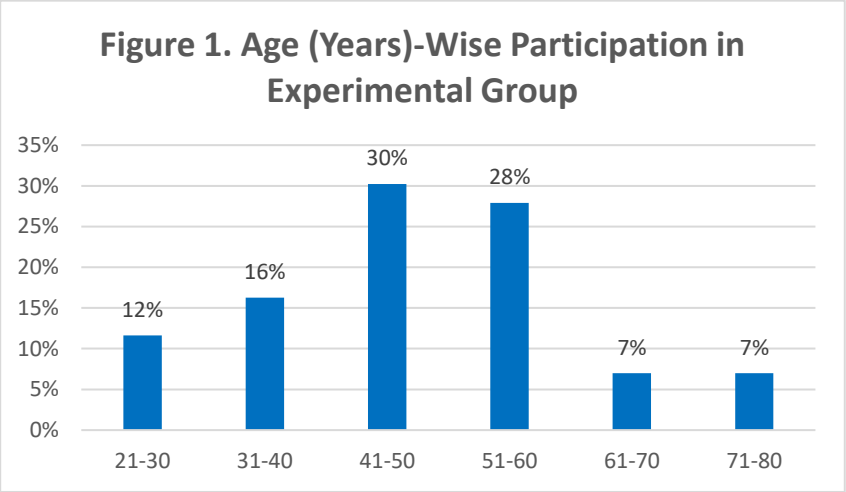


Figure 2 below shows gender-wise distribution of participants in the experimental group.

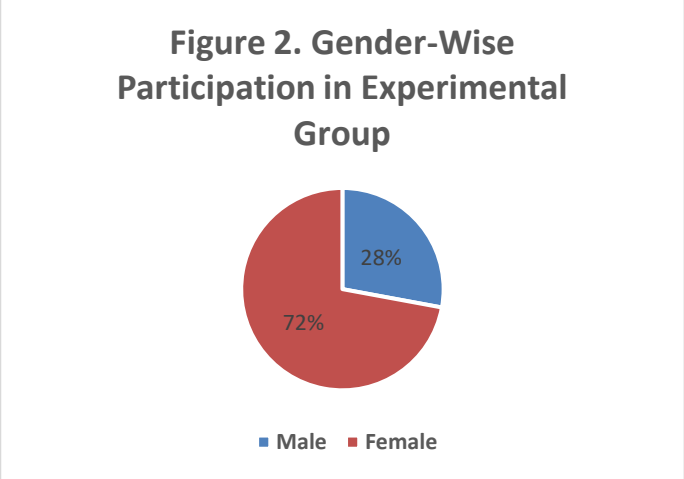


Figure 3 below shows session time-wise distribution of participants in the experimental group.

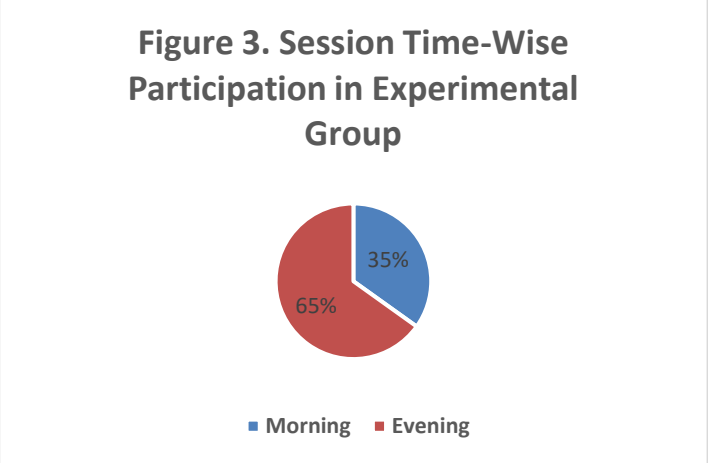


Figure 4 below shows MWQ results for the experimental and control groups. A lower post score indicates improvement in the symptoms (see data in Table 2).

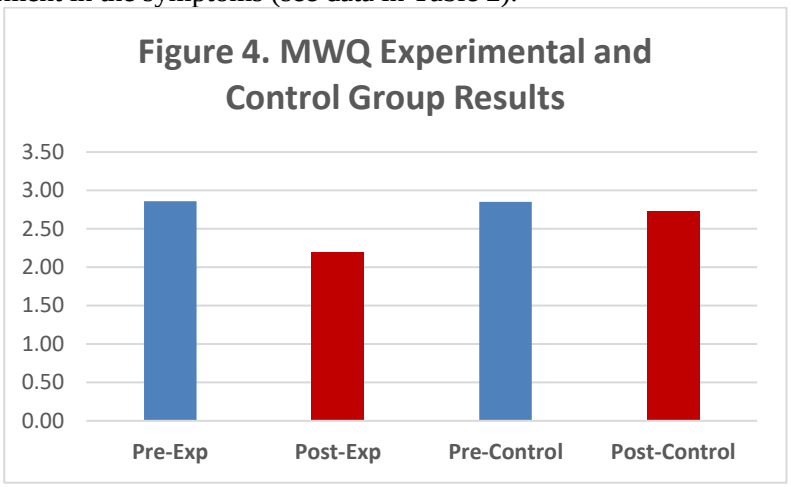


Figure 5 below shows MWQ Item-wise results in the experimental group. A lower post score indicates improvement in the symptoms (see data in Table 2).

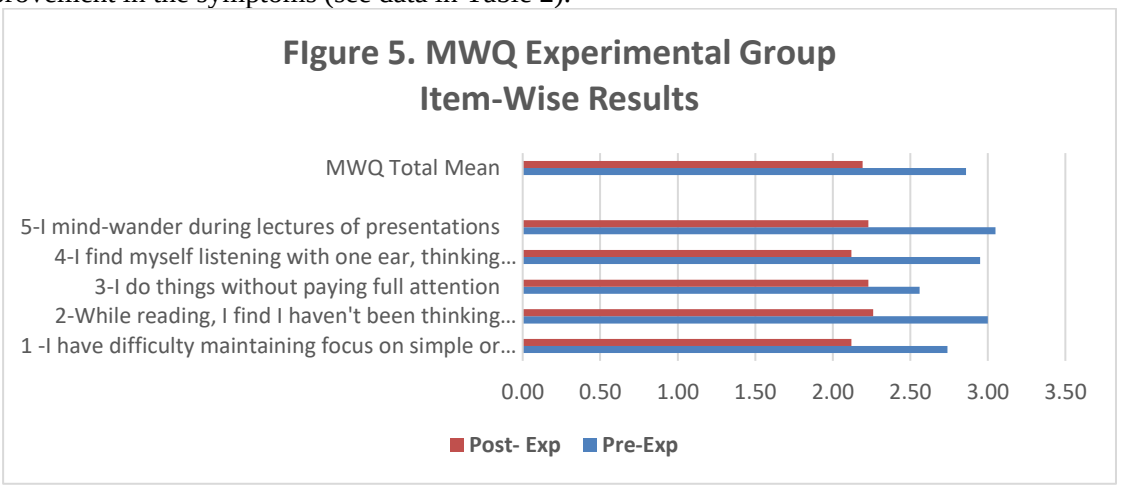


Figure 6 below shows MWQ Item-wise results in the control group. A lower post score indicates improvement in the symptoms (see data in Table 2).

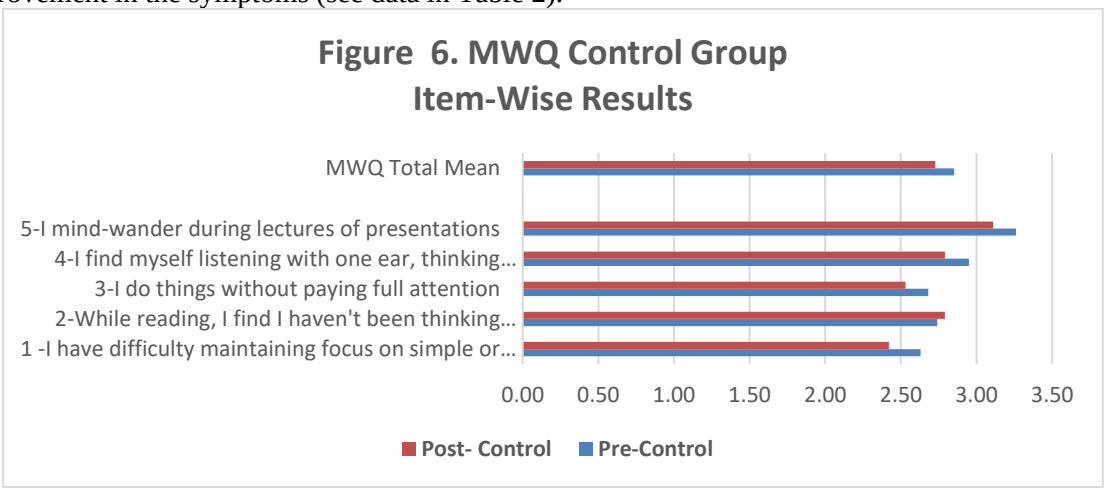


Figure 7 below shows VSC results of the experimental and control groups. A lower post score indicates improvement in the symptoms (See Table 3 for data).

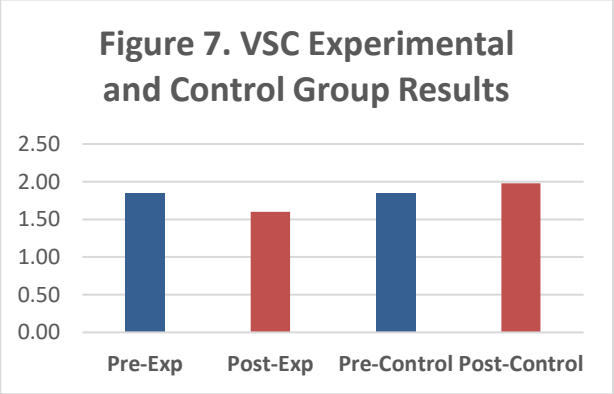


Figure 8 below shows VSC symptom-wise results of the experimental group. A lower post score indicates improvement in the symptoms (see Table 3 for data).

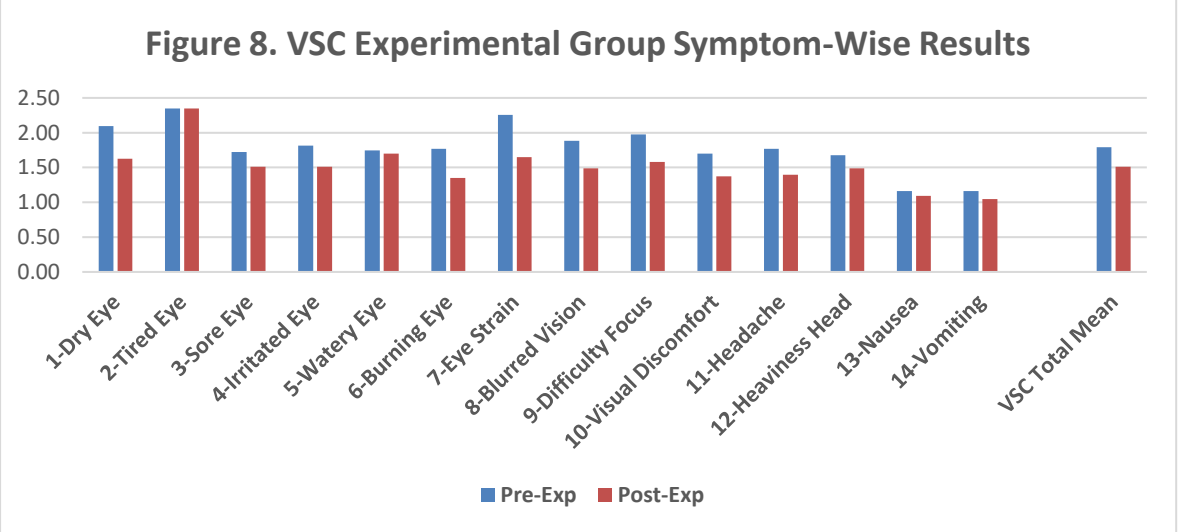
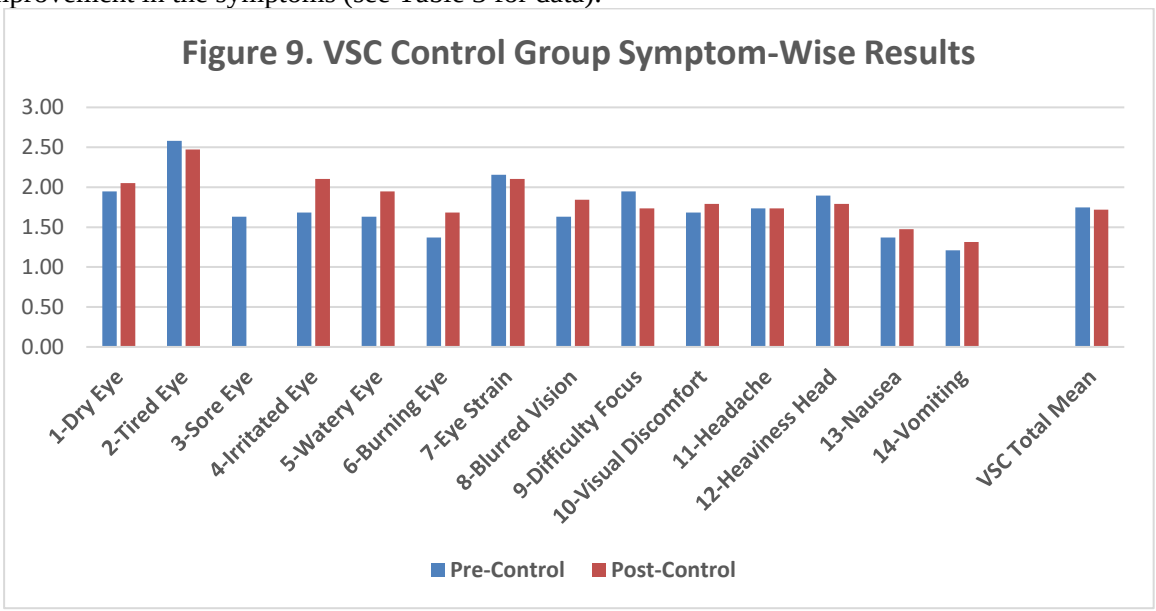


Figure 9 below shows VSC symptom-wise results of the control group. A lower post score indicates improvement in the symptoms (see Table 3 for data).



CHAPTER 6
DISCUSSION

6.1 Demography

Due to the practical limitations of online *yoga* sessions and geographical restrictions, the number of control group participants were significantly less (n=19) compared to intervention group (n=43). Therefore, caution must be used while generalizing these results to a larger population. However, some preliminary inferences can be drawn based on the data analysis of participants demography. Key observations of the demographic data analysis shown in Figures 1-3 are: good participation from age group 40-60 years (58%) (Figure 1); more participation by females (72%) than males (28%) (Figure 2); greater participation in evening (65%) than morning (35%) sessions (Figure 3). Note that two sessions' timings were offered as many participants were not available in the morning due to work and family-related responsibilities. It seems participants were more available in the evening to part take in the *yoga* session.

6.2 Mind Wandering Questionnaire (MWQ)

'Within Group' MWQ data analysis show that there was significant improvement in mind wandering of participants in experimental group post intervention ($p<0.001$ which is <0.05) (See Table 1). Thus, one can conclude that the data fails to reject the null hypothesis. The hypothesis stated in this research holds true statistically, "*Trataka* (*yogic* visual practices) helps improve concentration".

Further, the post mean score (2.19) of the experimental group was found to be much less than the pre mean score (2.86) indicating reduction in mind wandering and improvement in concentration of the participants taking part in the intervention (Table 2, Figure 4). Magnitude of change between pre and post scores in the control group was less (Table 2, Figure 4). *Note that a lower MWQ score indicates less mind wandering* (See MWQ scale scoring rubric in Appendix 3).

Detailed 'within group' analysis of each item in MWQ scale shows reduction in the post value for each of the 5-items in the MWQ scale (Figure 5). ***Item 4 "I find myself listening with one year, thinking about something else at the same time" score after yoga intervention reduced significantly (pre=2.95, post=2.12, a 28% change).*** This clearly indicates an increase in the concentration of participants post intervention (Table 2). In comparison, control group post data did not change much (Table 2, Figure 6).

6.3 Visual Strain and Fatigue Symptom Checklist (VSC)

VSC data analysis show a significant improvement in visual strain of participants in the experimental group after intervention ($p=0.002$ which is <0.05) (Table 1). Thus, one can conclude that the results fail to reject the null hypothesis. Therefore, the hypothesis stated in this research holds true statistically, " *Trataka* (*yogic* visual practice) helps reduce visual strain".

Further, the post mean score (1.60) of the experimental group was found to be less than the pre mean score (1.85) indicating reduction in visual strain and fatigue of participants taking part in the intervention (Table 3, Figure 7). *Note that a lower VSC score indicates reduced visual fatigue and strain* (See VSC scale scoring rubric in Appendix 2). Control group pre and post mean value did not differ much (Table 3, Figure 7).

Detailed 'within group' analysis of the experimental group data of each of the 14 symptoms in VSC scale shows a reduction in the response for each of the symptom (Table 3, Figure 8). ***Symptom 7 (eye strain) score after yoga intervention reduced significantly (pre=2.26, post=1.65, a 27% change).*** The control group data did not show much difference (Table 3, Figure 9).

To summarize, these results support findings of other similar research studies discussed earlier in this report using *Trataka* to study visual strain, discomfort, fatigue, and cognitive behavior changes. Ancient texts also have suggested that *Trataka* relaxes the eyes. ***One possible mechanism of relaxation*** could be that *Trataka* yogic eye practices may provide deep rest to ocular muscles, which can help in reducing visual strain and fatigue. Focusing on a point can help increase concentration, awareness, mindfulness and reduce mind-wandering leading to positive emotional regulation as supported by other *yoga* research findings (Daly et al., 2015; Menezes et al., 2015).

6.4 Strengths of the Study

- *Trataka yogic* visual practices were found to not only reduce visual fatigue and strain symptoms (red eye, dry eye, itchy eye etc.), which was one of the primary objectives of this study, but also helped participants in reducing their headaches, nausea, and vomiting symptoms.
- The yogic visual practices done in this study helped participants improve their concentration and reduce their mind wandering.
- This study's results provide scientific evidence supported by statistical tests that online (tele-yoga) sessions are as effective as in-person sessions. These sessions allowed participation of people from remote geographical locations, older people who could not travel and do not drive

could attend sessions from their home, and working professionals could attend from their workplace.

- Many participants self-reported reduced stress, increased focus, better sleep, and relaxation because of *Trataka* intervention.

6.5 Weakness of the Study

- The study period for this research was very short (2-weeks) that can affect the results. Attendance was very important. Many participants did not complete the required 80% attendance so their data could not be included in the results.
- Participants were mostly from Indian diaspora which has the potential to introduce bias in study results.
- Due to practical limitations, participants were allowed to self-select their group. Most of them choose to stay in experimental group as they wanted to experience the *Trataka yogic* practices. This resulted in a smaller control group (n=19) as compared to the experimental group (n=43). This could have affected the study results.
- Two session timings (morning and evening) may have also affected study results. Due to insufficient data points, it was not feasible to conduct analysis of morning vs evening participant's data.

6.6 Adverse Effects

Participants were asked to let know of any adverse effects of the practice immediately. One participant reported mild headaches on day one and discontinued the study. One participant reported that her eyes hurt looking at the bright screen and she had migraine initially for 2-3 days (note that she had a history of headache). Later she turned the screen in another direction or kept her smartphone down, which helped her, and she could continue practicing without any headache. No other adverse effects of the practices done in this study were reported.

6.7 Self-Reported Comments and Testimonials of the Participants

Participant's self-reported comments and testimonials provided qualitative assessments which were not covered by the VSC and MWQ scales. These comments indicate that visual strain of most of the participants reduced after intervention and their concentration also improved after doing the *Trataka* sessions. Several secondary outcomes were also self-reported such as an increase in focus, better sleep,

reduced stress, and a more relaxed state of body and mind. These comments and testimonials are attached in Appendix 5. A few testimonials are given below.

- One participant stated, "… Thank you for giving me the opportunity to do *Trataka* sessions with you. It was very nicely done. You are very organized and very prompt with all directions while we do the session. Your voice is very soothing and relaxing. The sessions really relaxed me, taught me such simple eye exercises combined with breathing is such a powerful relaxation tool. I slept so well all throughout the 2-week session. That sleep was not something that I have experienced in a very long time (many years). Even though I have studied *yoga*, only when I did guided *Trataka* sessions did I realize how powerful these techniques were. Thank you for introducing me to these techniques. It was a very pleasant experience."

- Another one wrote, "I was always interested in learning *yoga*/meditation as I struggled to focus on a serious subject. I tried multiple ways to meditate, I think in the end *Trataka yoga* solved the puzzle for me as I saw immediate effects after each session. I felt much more relaxed at the end of the sessions and was not getting distracted during the practice, like my experience with singing songs, bhajan, or playing games. I want to continue, but I need a group to practice it."

- Another testimonial said, "… The zoom sessions were very well organized, with clear instructions and demonstration of each kriya. Since I did the morning session at 7:30 am, it was the best thing I could have done for myself to jumpstart my day. The first two days, I felt some unfamiliar changes around my eyes – I am not sure if it was strain in the muscles, but it seemed like that, and I think it was due to using the eye muscles I had never used before as much and for such prolonged time and with so much focus. My eyelids also twitched for the first two days. But by the third day, I started feeling the positive impact of *Trataka yoga*….Overall, I had a very positive experience during the 30 minutes of doing *Trataka*, and during the day. I felt my focus had increased, so I got a better sleep. I had never consciously thought about my peripheral vision, focus and attention span and things that I unconsciously do when I am reading (like losing my focus), or in a meeting, until I did *Trataka* and filled out the questionnaire."

- One more participant wrote, "… it helped with my vision strain, concentration, stress, and overall sleep. I noticed improvements in my physical and mental health, such as my posture, and reduced stress, anxiety, and depression. Additionally, *yoga* helped improve my focus, concentration, and overall cognitive function. As for my vision, I noticed some alleviation from eye strain. For example, the practice helped me focus on a fixed point, which I felt helped reduce eye fatigue. In terms of sleep, I felt the practice helped improve my sleep quality and

duration. … I think that applying daily meditation practices would greatly help in everyday life and not waking up with a clouded mindset."

6.8 CONCLUSIONS

Results of this study provide scientific evidence that *Trataka yogic* visual practice has the potential to be used as an alternative therapy to help reduce visual fatigue and strain and improve concentration. Results suggest that tele-*yoga* sessions are as effective as in-person sessions in making *yoga* practices accessible to participants in remote areas. Participants self-reported comments and testimonials provide evidence for achieving several secondary positive outcomes of this study such as reduced stress, better sleep, increased focus, and a relaxed state of mind and body. Each of these secondary outcomes can be further studied in more detail.

Future Work: A comprehensive research study using a larger sample size on wider population targeting different age groups, children, adults, seniors, public schools, universities can provide further scientific evidence about use of *Trataka yogic* visual practices as an alternative therapy for treating vision strain, fatigue, and psychological well-being.

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Appendix 1. *Trataka* Research Study Protocol (March 6-17, 2023, Monday-Friday, 7:30 am and 6:30 pm PST)

	Practices	**Notes**	**Time (Min)**	**Rounds**
0	**Instructions**		1	
1	**Opening**	Silence, Breath awareness, 3-*Om*	2	3
2	**Preparatory Eye Exercises/Loosening**			
	Blinking followed by simple palming	Blink 10 times fast - 10 sec rest	1	3
	Relaxed movement of both eyeballs in the horizontal directions (Left-Right) SIMPLE PALMING	During palming rub both the palms, cup the eyes without touching the eyeballs, feel the warmth, take deep breath, and relax	1	5
	Relaxed movement of both eyeballs in the vertical directions (up-down) - SIMPLE PALMING		1	5
	Relaxed movement of both eyeballs diagonal in both the directions - PRESS (Inhale) and RELEASE (Exhale) PALMING		2	5
	Relaxed movement of both eyeballs in the clockwise and anticlockwise directions - CONSTANT PALMING		2	5
3	***JATRU TRATAKA* PRACTICES**			
	Vama Jatru T*rataka* - SIMPLE PALMING	Both eyeballs movement to left using the thumb nail of the left hand. Hold the gaze at the last round and count 5	1.5	5
	Dakshina Jatru Trataka - SIMPLE PALMING	Both eyeballs movement to the right using the thumb nail. Hold the gaze at the last round and count 5	1.5	5
	Urdhwamukha Jatru Trataka - SIMPLE PALMING	Both eyeballs movement upward using the thumb nail of one hand. Hold the gaze of the last round and count 5	1.5	5
	Adhomukha Jatru Trataka - SIMPLE PALMING	Both eyeballs movement downward using the thumb nail of one hand. Hold the gaze of the last round and count 5	1.5	5
	Eye rotation with the help of thumb – PRESS (inhale)-n-RELEASE (exhale) PALMING	Both eyeballs movement in clockwise and anticlockwise directions gazing at the thumb of one of the hands	2	5
	Bhrumadya - CONSTANT PALMING with *Bhramari*	Use the tip of the index finger of one of the hands. Move it forward and backward closer to	2	5

		the centre of the eyebrows. Look at the finger with both eyes. Hold the gaze of the last round and count 5		
	Nasikagriha - CONSTANT PALMING with *Bhramari*	Use the tip of the index finger of one of the hands. Move it forward and backward closer to the tip of the nose. Hold the gaze of the last round at the tip of the nose for count of 5	2	5
	Ubhaya Jatru Trataka - CONSTANT PALMING with *Bhramari (Bee sound)*	Movement of the eyeballs focusing on the thumb nail of both the hands held straight at shoulder level as a reference point. Moving the right hand in right direction and left hand in left direction. Followed by constant palming with *Bhramari* chanting	2	5
4	***A-U-M* Chanting**	*A, U, M, A-U-M kara* chanting	2	3
5	**Relaxation (Sitting or Savasana)**	Deep Breathing - Inhale (count of 4), Exhale (count of 6)	2	10
6	**Closing**	3-*Om*, Silence	2	
			30	

Appendix 2. Visual Fatigue and Strain Symptoms Checklist (VSC)

For each question below, circle the response that best characterizes how you feel about the symptom in the last one week.

Symptoms	Never	Rarely	Occasionally	Often	Nearly Always
1. Dry eye	1	2	3	4	5
2. Tired eye	1	2	3	4	5
3. Sore/aching eye	1	2	3	4	5
4. Irritated eye	1	2	3	4	5
5. Watery Eye	1	2	3	4	5
6. Burning eye	1	2	3	4	5
7. Eye strain	1	2	3	4	5
8. Blurred vision	1	2	3	4	5
9. Difficulty in focusing	1	2	3	4	5
10. Visual discomfort	1	2	3	4	5
11. Headache	1	2	3	4	5
12. Heaviness of head	1	2	3	4	5
13. Nausea	1	2	3	4	5
14. Vomiting	1	2	3	4	5

Scoring: VSC is used to measure visual fatigue and strain using a 14-point symptoms checklist. Each symptom is assessed for severity using a 5-point Likert scale of severity (1-never, 2-rarely, 3-occasionally, 4-often, 5-nearly always). An average of all scores is calculated and reported. A lower score indicates improvement in the symptoms.

Reference: Saoji et al., 2022; Vasan et al., 2022

Appendix 3. Mind Wandering Questionnaire (MWQ) Scale

For each question below, circle the response that best characterizes how you feel in the last one week.

MWQ Items 1-5	Almost Never	Very Infrequently	Somewhat Infrequently	Somewhat Frequently	Very Frequently	Almost Always
Item1 - I have difficulty maintaining focus on simple or repetitive work	1	2	3	4	5	6
Item 2 - While reading, I find I haven't been thinking about the test and must therefore read it again	1	2	3	4	5	6
Item 3 - I do things without paying full attention	1	2	3	4	5	6
Item 4 - I find myself listening with one ear, thinking about something else at the same time	1	2	3	4	5	6
item 5 - I mind-wander during lectures of presentations	1	2	3	4	5	6

Scoring: MWQ is a 5-item scale to assess mind wandering. Each item is assessed for severity using a 6-point Likert scale of severity (1-almost never, 2-very infrequently; 3-somewhat infrequently; 4-somewhat frequently; 5-very frequently; 6-almost always). An average of all scores is calculated and reported. A lower value indicates improvement in the symptoms.

Reference: Mrazek, M.D., et al. (2013), Saoji et al. (2022)

Appendix 4. MWQ and VSC Pre and Post Data

Participant's Unique ID*	MWQPre	MWQPost	VSCPre	VSCPost
Experiment#1	2.60	1.80	1.86	1.14
Experiment#2	3.80	2.80	2.29	1.93
Experiment#3	4.60	3.00	1.64	1.93
Experiment#4	3.40	1.80	2.07	1.43
Experiment#5	2.40	2.20	2.29	2.64
Experiment#6	4.60	2.20	1.21	1.50
Experiment#7	3.60	2.00	2.64	2.50
Experiment#8	2.20	2.40	2.71	1.43
Experiment#9	3.20	4.00	2.29	2.50
Experiment#10	2.20	2.20	2.36	1.93
Experiment#11	5.00	4.20	2.21	1.00
Experiment#12	5.40	4.00	1.86	1.71
Experiment#13	3.00	2.60	2.57	1.79
Experiment#14	4.60	2.60	2.00	2.21
Experiment#15	3.60	2.20	2.36	1.79
Experiment#16	1.20	1.00	1.00	1.00
Experiment#17	2.40	1.40	1.71	1.29
Experiment#18	2.60	2.00	1.43	2.00
Experiment#19	3.20	2.00	2.36	1.93
Experiment#20	2.80	1.80	1.79	1.29
Experiment#21	1.20	1.00	1.57	1.14
Experiment#22	1.00	1.40	1.00	1.00
Experiment#23	3.00	1.80	1.36	1.57
Experiment#24	3.60	2.80	2.14	2.07
Experiment#25	3.20	2.60	1.29	1.50
Experiment#26	2.20	2.20	1.14	1.14
Experiment#27	3.60	3.00	1.36	2.50
Experiment#28	3.40	3.00	2.50	1.57
Experiment#29	1.00	1.00	1.14	1.00
Experiment#30	2.40	1.60	2.79	1.86
Experiment#31	2.20	1.20	2.29	1.21
Experiment#32	2.00	2.00	1.57	1.14
Experiment#33	1.20	1.40	1.29	1.21
Experiment#34	3.00	3.00	2.00	2.14
Experiment#35	2.60	1.20	1.36	1.00
Experiment#36	2.80	2.00	1.29	1.00
Experiment#37	1.60	1.40	1.14	1.00
Experiment#38	2.80	3.40	2.64	3.00
Experiment#39	5.40	4.80	2.86	1.86
Experiment#40	2.60	1.00	1.86	1.57
Experiment#41	2.80	1.80	1.79	1.43
Experiment#42	1.00	1.00	1.14	1.07
Experiment#43	2.00	1.40	1.64	1.21
Control#1	4.40	3.80	1.79	1.86
Control#2	2.60	2.80	1.21	1.64

Control#3	3.60	3.00	2.36	1.43
Control#4	2.40	5.00	1.57	3.43
Control#5	3.60	2.60	2.36	2.14
Control#6	2.60	3.40	1.57	2.57
Control#7	1.20	4.20	2.14	2.50
Control#8	3.60	2.40	2.50	1.29
Control#9	2.60	3.80	2.64	2.36
Control#10	4.20	3.40	2.36	2.50
Control#11	2.60	1.00	1.43	3.00
Control#12	4.60	2.40	2.07	1.14
Control#13	4.40	1.40	2.00	1.00
Control#14	1.20	2.00	1.14	1.43
Control#15	2.20	1.00	1.43	1.29
Control#16	1.80	2.60	1.29	1.86
Control#17	2.00	2.40	1.93	1.57
Control#18	2.20	1.20	1.43	2.14
Control#19	2.20	2.60	2.00	2.64

* Experiment# ID of participants in the experimental group
* Control# ID of participants in the control group

Appendix 5. Self-Reported Comments and Testimonials of Participants in the Experimental Group

I feel more relaxed and focused
it was a great morning practice, felt energetic the whole day, I do lot of intricate work with eyes like painting and art, i feel the difference, really soothes the eyes.
Eyes felt more relaxed and energetic all day
It has been a great experience to attend Rajani 's *Trataka* yoga practice. I'm doing eye exercises. I feel very relaxed after the class. I also feel the chakra in between the eyes is activated during some of the exercises for few seconds!! She teaches in a very easy and calm way!! Even though I have been practicing Yoga on and off for so many years now didn't know much about this particular practice until I started attending her classes. Thank you very much for the classes, Rajani ji!! Keep up the good work
It has been very useful with eye strain and deep breathing. Certainly, helped him.
One of the best guided yogas I have done, great clear instructions
After the day's work, doing *Trataka* Yoga in the evening provided very good relaxation to mind and the eyes.
I really liked it, and it helped me in learning how to focus.
Systematic steps, easy to follow and remember
I enjoyed the sessions. The explanations and reminders to breathe were helpful.
Thank you for these sessions! I feel pretty relaxed when I do them.
Feel comforted in eyes, sleep is better, have dry eyes- feel some tears after *trataka*
Enjoyed the classes. It was relaxing for the eyes and energizing at the same time.
I loved it and would like to continue the practice
Definitely effective. Very relaxing. Started to feel the difference from the first session itself.
It was very relaxing experience.
It was definitely relaxing for the 30 mins session. Though I couldn't attend all the 5 days in a week. I'll definitely try to practice the exercises at home for distressing. Thank you so much Rajni ji for helping and motivating me to continue the sessions! All the very best
Found the overall effect very relaxing. I did find an improvement in my eyes except for a few days during the last week due to workload.
1. It relaxes our mind and body. 2. Definitely my sleep cycle has improved. I go deep while I am sleeping. 3. Feel refreshed and energized after the session.
I was impressed at the obvious gain in eye strength and focus. Having to drive in the rain and in early morning/later evening hours was not as challenging as it has been at times. I definitely gained focus and concentration and had a noticeable reduction in stress. To the point of literally falling asleep at the end of session.
I'm doing good eye exercises. Feel relaxed n calm after the session. Used to have mind foggiest now I can think clear and focus better than before
It was very good and helped me to focus on other things better
it has been wonderful. Increased concentration and focus. It also calms me down
Feel very relaxed, eyes feel cool able to see better without my reading glasses
The *trataka* classes were very helpful in focusing, felt relaxed and had good eye exercises too!! Rajani ji is a very good teacher and feeling blessed to attend her two weeks class.
It was a wonderful experience. Difficult technique taught by you in very humble and easy way.
Sessions have generally improved my peripheral vision and have helped in relaxing my eyes. I also feel calmer.
It may be unrelated but after the 2nd day, I have had an almost constant low-grade headache.
1st…I fell asleep again in practice tonight. I definitely feel more relaxed and attentive. My mind is not wandering as much. My eyesight is sharper and eyes less irritated and tired after driving! I also realize that I am dealing with behaviour developed to cope with multiple head injury trauma. Doing

this is making me more aware of how I process things. I am also having cataracts removed in near future. My ophthalmologist said I have good vision however.
It was wonderful experience, very relaxing
The experience was really good with all the sessions. I am feeling more composed and relaxed even after a hectic schedule. The eyes are gentler even after spending hours in front of screen. I will try to continue the same exercises on my own.
It was very good class. I do feel my sleep is slightly better. I have to do this for longer time to know the difference in my eyesight improvement.
My peripheral vision has improved. Watering of my eyes has stopped.
Good session. Did not feel much difference in the first week. Gradually body started relaxing. Felt the eye muscles getting stronger
Refreshing, I can feel my focus improving and issues with sore/watery eyes reducing
Had a very good experience. Felt relaxed and refreshed after each session.
Very helpful session: I learned some helpful *Trataka* techniques.
Wonderful experience, very calming
I had a wonderful time during these sessions which helped relax my body and calm down my emotions too. The instructions were very well and clearly explained by the instructor and the pace of the session was well managed.
Eyes and mind feel relaxed and felt improvement in peripheral vision
Relaxing and calming when doing Om chanting
It was a really nice experience. I will keep practicing. I see the improvements. My eyes don't get tired that often. And focus on work is improved too. I enjoyed all the sessions.
It was a good experience, it helped in strengthening my eye muscles.
Good and effective. Initially, I had watery eyes
Trataka was very relaxing. Eyeball movement seemed to have become smoother
The *Trataka* practice definitely improved multiple issues as related below. Given that it was spring vacation, and there was a vacation schedule and lack of access due to time or connectivity. I was unable to complete, effectively, the second two weeks. However, I did do practice at home. Staying focused while reading has been difficult for me since I was a child. I would say I have added, and this practice has helped with focus. This was a very helpful tool to learn. I've not utilized it as I was trained to do. Thank you for helping me revisit my training and for sharing your expertise.
TESTIMONIAL - One of the participants' stated, "… Thank you for giving me the opportunity to do *Trataka* sessions with you. It was very nicely done. You are very organized and very prompt with all directions while we do the session. Your voice is very soothing and relaxing. The sessions really relaxed me, taught me such simple eye exercises combined with breathing is such a powerful relaxation tool. I slept so well all throughout the 2-week session. That sleep was not something that I have experienced in a very long time (many years). Even though I have studied yoga, only when I did guide *Trataka* sessions did I realize how powerful these techniques were. Thank you for introducing me to these techniques. It was a very pleasant experience."
TESTIMONIAL - Another one wrote, "I was always interested in learning yoga/meditation as I struggled to focus on a serious subject. I tried multiple ways to meditate, I think in the end *Trataka* yoga solved the puzzle for me as I saw immediate effects after each session. I felt much more relaxed at the end of the sessions and was not getting distracted during the practice, like my experience with singing songs, bhajan, or playing games. I want to continue, but I need a group to practice it."
TESTIMONIAL - Another participant said, "… The zoom sessions were very well organized, with clear instructions and demonstration of each kriya. Since I did the morning session at 7:30 am, it was the best thing I could have done for myself to jumpstart my day. The first two days, I felt some unfamiliar changes around my eyes - I am not sure if it was strain in the muscles, but it seemed like that, and I think it was due to using the eye muscles I had never used before as much and for such prolonged time and with so much focus. My eyelids also twitched for the first two days. But by the third day, I started feeling the positive impact of Trataka yoga…. Overall, I had a very positive experience during the 30 minutes of doing *Trataka*, and during the day. I felt my focus had

increased, so I got a better sleep. I had never consciously thought about my peripheral vision, focus and attention span and things that I unconsciously do when I am reading (like losing my focus), or in a meeting, until I did *Trataka* and filled out the questionnaire."
TESTIMONIAL - One participant wrote, "… it helped with my vision strain, concentration, stress, and overall sleep. I noticed improvements in my physical and mental health, such as my posture, and reduced stress, anxiety, and depression. Additionally, yoga helped improve my focus, concentration, and overall cognitive function. As for my vision, I noticed some alleviation from eye strain. For example, the practice helped me focus on a fixed point, which I felt helped reduce eye fatigue. In terms of sleep, I felt the practice helped improve my sleep quality and duration. … I think that applying daily meditation practices would greatly help in everyday life since waking up with a clouded mindset".

- Comments are given 'as-it-is' self-reported by participants.