Chapter 5

Materials and Methods

5.0	**MATERIALS AND METHODS**	**40-63**
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There were three different studies carried out under this doctoral work as follows:

- The changes in heart rate variability before, during, and immediately following the practice of *trāṭaka* compared with the control session
- Performance in Simple Visual Reaction Time task at baseline and following the practice of *trāṭaka* and eye exercise session.
- The changes in visual strain, mind-wandering, and mindfulness before and following 2 weeks of intervention of *trāṭaka* and control group.
- Performance in Corsi Block Tapping Task was studied at baseline, and following the practice of *trāṭaka* and Control sessions.

The methodology of the research has been described under the following sub-headings:

5.1. PARTICIPANTS

5.2. DESIGN

5.3. VARIABLES STUDIED:

5.4. INTERVENTION

5.5. DATA EXTRACTION

5.6. DATA ANALYSIS

5.1. PARTICIPANTS:

5.1.1. SAMPLE SIZE

The sample size was calculated by using G power, where alpha was 0.05, and Power was 0.8. The effect size was found to be 0.69 (Raghavendra & Singh, 2016), and the recommended sample size resulted in 20 participants in each session. Considering dropouts, we decided to have 30 participants for each session.

The sample size was calculated using the G*Power computer program (Faul et al., 2007). Recommended sample size in each group is found to be 48 participants, considering the previous study on the effect of yoga breathing on mind-wandering and mindfulness (Saoji et al., 2018). Alpha was 0.05, the Power was 0.8, and the effect size was 0.58. Considering the possible attrition, we decided to take 55 participants in each group.

The sample size was calculated using G*power, where alpha was 0.05 and Power was 0.8. The effect size was found to be 0.50 (Gupta et al., 2019). The recommended sample size resulted in 33 participants for each session. Considering dropouts at about 25 percent during the training, we decided to have 41 participants for each session.

5.1.2. SELECTION OF THE PARTICIPANTS

The participants had a minimum of six months of experience in the practice of Yoga and were regular in their practice. The participants were residential students at Swami Vivekananda Yoga Anusandhana Samsthana, a Deemed University, Bangalore. They had all enrolled in graduate and postgraduate programs in yoga

5.1.3. INCLUSION CRITERIA

a. Normal healthy adult volunteers between the age group of 18-35 years were included in to study

b. Physical health was evaluated through routine clinical examination by a trained physician; psychological health was assessed through GHQ 12.

c. Normal vision (6/6) as checked using Snellen's chart

d. Participants with prior experience of yoga practices of a minimum of six months were included.

e. Participants with right-hand dominance were included since handedness impacts psychophysiology differentially (Ashworth et al., 2008; Stoianov et al., 2011).

5.1.4. EXCLUSION CRITERIA

a. We excluded participants with any known eye disorders, including refractive errors, color blindness, glaucoma, cataract, history of ophthalmological surgeries, laser surgeries, etc.

b. The presence of cognitive or neurological disorders (Epilepsy), respiratory or cardiac disorders, sensory abnormalities

c. Participants who have difficulty focusing/concentrating

d. History of smoking or alcoholism may influence the psychophysiological functions

e. Female participants during pregnancy or lactation. Additionally, assessments of female participants were avoided during the menstrual phase as the menstrual cycle is known to influence cognition (Colzato et al., 2010) and autonomic nervous system activity (Hirshoren et al., 2002).

5.1.5. ETHICAL CONSIDERATION

The participants were explained the aim and method of the study, and the informed consent was signed by all participants (a sample copy is enclosed in Appendix-1). None of them were aware of the hypothesis of the study. The study was approved by the institution's ethics committee (IEC) of Swami Vivekananda Yoga Anusandhana Samsthana, Bangalore. Reference numbers of IEC: RES/IEC-SVYASA/182-A/2021, RES/IEC-SVYASA/182-

B/2021, and RES/IEC-SVYASA/182-C/2021. The IEC approval letter is enclosed in Appendix 2

Table 05:-The characteristics of participants assessed for the Autonomic variables and Visual reaction time for *trāṭaka* and control sessions

Sl.No	Subject Code	Gender	Age	Experience of Yoga in Year	Height	Weight	BMI
1	ASV	Female	23	5	162	57	21.72
2	AHV	Female	23	5	149	50	22.52
3	BBV	Female	26	6	157	57	23.12
4	VVB	Female	25	5	155	53	22.06
5	BVB	Female	22	5	155	52	21.64
6	RAH	Male	24	8	174	59	19.49
7	HAR	Female	23	5	166	77	27.94
8	FTR	Female	23	5	150	61	27.11
9	SEY	Female	23	5	161	57	21.99
10	JHU	Male	23	6	167	58	20.8
11	KJU	Male	23	7	179	71	22.16
12	GYU	Male	23	5	186	86	24.86
13	MNN	Female	23	5	166	80	29.03
14	ABH	Female	22	5	161	97	37.42
15	SRS	Female	25	5	148	49	22.37
16	NMN	Female	23	5	160	47	18.36
17	PKU	Female	23	5	160	49	19.14
18	PIN	Female	25	5	167	59	21.16

19	RAC	Female	22	6	157	56	22.72
20	RAJ	Male	23	5	183	88	26.28
21	RUB	Female	25	5	152	42	18.18
22	SAT	Male	23	5	180	92	28.4
23	SHI	Female	23	5	162	69	26.29
24	SPO	Female	23	5	159	90	35.6
25	SUR	Female	23	5	155	54	22.48
26	SWE	Female	23	5	163	54	20.32
27	TEJ	Female	23	5	158	59	23.63
28	VIV	Male	23	6	178	71	22.41
29	YAJ	Female	23	8	155	55	22.89
30	THJ	Male	22	5	168	63	22.32
Mean			**23.27**	**5.40**	**163.10**	**63.73**	**23.81**
St. Deviation			**0.96**	**0.84**	**10.00**	**14.66**	**4.38**

Table 06:–The characteristics of participants assessed for the Visual Strain & Psychological variables for Control Group

Sl.No	Subject Code	Gender	Age	Experience in Yoga
1	KKS	F	22	4
2	SPK	F	24	6
3	LDM	F	24	6
4	BJU	F	24	6
5	SJH	F	21	3
6	OPK	F	22	4
7	ANI	F	23	5
8	GAU	F	25	7
9	THU	F	23	5
10	HEM	F	24	6
11	IHY	F	25	7
12	THK	F	23	5
13	FGH	F	22	4
14	KJU	F	23	5
15	HNB	F	26	8
16	KOP	F	21	3
17	DDT	F	23	5
18	RTH	F	21	3
19	SER	F	24	6
20	TGH	F	21	3
21	XRR	F	25	7
22	FSE	F	22	3
23	TGW	F	24	6
24	YUP	F	23	5
25	RET	F	21	3
26	TES	F	23	5
27	NBY	F	24	7
28	WET	F	22	4

29	IGF	F	23	5
30	LMJ	F	22	4
31	UHB	F	24	6
32	QUJ	F	22	4
33	OLP	F	29	11
34	EYH	F	26	8
35	GUN	F	30	12
36	CMN	F	26	8
37	TYU	F	26	8
38	UPL	F	27	9
39	FIL	F	30	12
40	SWY	F	25	7
41	DRD	F	29	11
42	POP	F	28	10
43	GHO	M	22	4
44	PKO	M	24	6
45	PKB	M	24	6
46	VIR	M	23	5
47	TYJ	M	23	5
48	QJO	M	36	18
49	BUG	M	27	9
50	TUH	M	30	12
51	UJK	M	27	9
52	LOV	M	27	9
53	HJU	M	28	10
MEAN			**24.585**	**6.5849**
St.deviation			**2.9424**	**2.9616**

Table 07:–The characteristics of participants assessed for the Visual Strain & Psychological variables for *trāṭaka* Group

Sl.No	Subject Code	Gender	Age	Experience in Yoga
1	HJK	F	24	6
2	BJL	F	24	6
3	NMK	F	21	3
4	PGG	F	21	3
5	YHP	F	23	5
6	GUC	F	23	5
7	FUB	F	24	6
8	QKO	F	22	4
9	FKP	F	22	4
10	HLB	F	24	6
11	FDN	F	21	3
12	RPJ	F	22	4
13	XUP	F	23	5
14	FWU	F	22	4
15	DSR	F	23	5
16	WPM	F	21	3
17	APJ	F	22	4
18	DSY	F	25	7
19	CHP	F	25	7
20	KQP	F	19	2
21	APG	F	25	7
22	CYF	F	26	8
23	FLP	F	23	5
24	MAF	F	21	3
25	RTU	F	22	4
26	VSD	F	25	7
27	PLH	F	23	5
28	CUH	F	24	6

29	BUC	F	21	3
30	MUI	F	22	4
31	CYL	F	20	2
32	SPP	F	22	4
33	PGH	F	25	7
34	VYJ	F	21	3
35	LPI	F	22	4
36	WUI	F	24	6
37	ONG	F	23	5
38	DLG	F	22	4
39	BPC	F	21	3
40	APH	F	23	5
41	CUM	F	21	3
42	WON	F	25	7
43	BET	F	23	5
44	CUU	M	23	5
45	BYH	M	24	6
46	GMK	M	22	4
47	BUK	M	23	5
48	NGK	M	22	4
49	FPL	M	22	4
50	WUD	M	24	6
51	LVE	M	21	3
52	SHA	M	22	4
53	VID	M	24	6
Mean			**22.68**	**4.70**
St.deviation			**1.48**	**1.44**

Table 08: The characteristics of participants assessed for the performance in the Corsi Block Tapping Task before and following *trāṭaka* and control sessions

Sl No	Subject Name	Gender	Age	Yoga Exp
1	ASV	Female	23	4
2	AHV	Female	23	4
3	BBV	Female	23	4
4	VVB	Female	23	4
5	BVB	Female	26	6
6	RAH	Female	28	6
7	HAR	Female	23	4
8	FTR	Male	23	4
9	SEY	Male	23	4
10	JHU	Female	23	4
11	KJU	Male	23	4
12	GYU	Male	23	4
13	MNN	Female	31	7
14	ABH	Female	23	4
15	SRS	Female	23	4
16	NMN	Female	23	4
17	PKU	Female	23	4
18	PIN	Male	25	5
19	RAC	Female	23	4
20	RAJ	Male	23	4
21	RUB	Female	23	4

22	SAT	Male	26	5
23	SHI	Female	23	4
24	SPO	Female	23	4
25	SUR	Female	23	4
26	SWE	Female	24	4
27	TEJ	Female	23	6
28	VIV	Female	26	5
29	YAJ	Female	28	7
30	THJ	Female	27	7
31	VIDYA	Female	29	2
32	ADY	Female	19	2
33	KAV	Female	19	2
34	SWT	Female	19	2
35	PRE	Female	19	2
36	ANN	Female	19	2
37	SAR	Female	19	2
38	HIT	Male	23	2
39	ARU	Female	19	2
40	SRI	Female	24	5
41	CHI	Female	19	2
Mean			**23.22**	**3.98**
St. Deviation			**2.82**	**1.42**

5.2. DESIGN OF THE STUDY:

5.2.1. STRUCTURE OF THE SESSIONS

We adapted the self as control trial to assess the autonomic changes and visual reaction time, wherein each participant was assessed twice during experimental and control sessions. The assessments for Autonomic changes were done for the duration of 5 min before, 20 min for during the session, and immediately after the practice of *trāṭaka* or control session. For the Simple Visual reaction time task, the assessments were done for the duration of 5 min before and immediately after the practice of *trāṭaka* or control sessions.

For Visual strain and psychological well-being, the study followed a single-centre randomized, parallel-group trial. The study consists of the experimental and control group in which the allocation of subjects was done with a 1:1 ratio.

We executed a within-subjects repeated measures design. All participants underwent baseline assessment, followed by two weeks of training in *trāṭaka* (including eye exercise).

Sl.No	Variables Studied	Study Design	Sample size	No of subjects/recording sessions
1	Autonomic Variables & Visual Reaction Time	Self as control	30	4
2	Visual Strain & Psychological Well-being	Randomized controlled trial	106	2
3	Performance of CBTT	Repeated measure	41	3

5.2.2. ORDER OF THE SESSIONS

5.2.2.1. Autonomic and Visual Reaction Time:

Half of the total participants were randomly allocated to *trāṭaka* on the first day and control session on the next visit to the laboratory and the other half had the order reversed. The order of the sessions was allotted randomly using computer-generated random numbers. This random allotment was done to prevent the influence of being exposed to the laboratory setting for the first time.

Figure 1: Schematic representation of the self as control study design used for assessment of Autonomic variables and Visual Reaction time

<table>
<tr><td rowspan="2">PRE (5min)</td><td colspan="4">During – Trāṭaka (20min)</td><td rowspan="2">POST (5min)</td></tr>
<tr><td>D1 (5min)</td><td>D2 (5min)</td><td>D3 (5min)</td><td>D4 (5min)</td></tr>
</table>

<table>
<tr><td rowspan="2">PRE (5min)</td><td colspan="4">During – Eye Exercise (20min)</td><td rowspan="2">POST (5min)</td></tr>
<tr><td>D1 (5min)</td><td>D2 (5min)</td><td>D3 (5min)</td><td>D4 (5min)</td></tr>
</table>

Pre-Assessments of SVRT task (5min)	**Intervention – *Trāṭaka* (20min)**	**Post-Assessments of SVRT task (5min)**

Pre-Assessments of SVRT task (5min)	**Intervention –** Eye exercise **(20min)**	**Post-Assessments of SVRT task (5min)**

5.2.2.2. Visual Strain & Psychological well-being

The random number sequences were generated using a web-based computer program (https://www.randomizer.org/). The allocation sequence was concealed using sequentially numbered, sealed, opaque envelopes. The study investigators and outcome assessor were blinded.

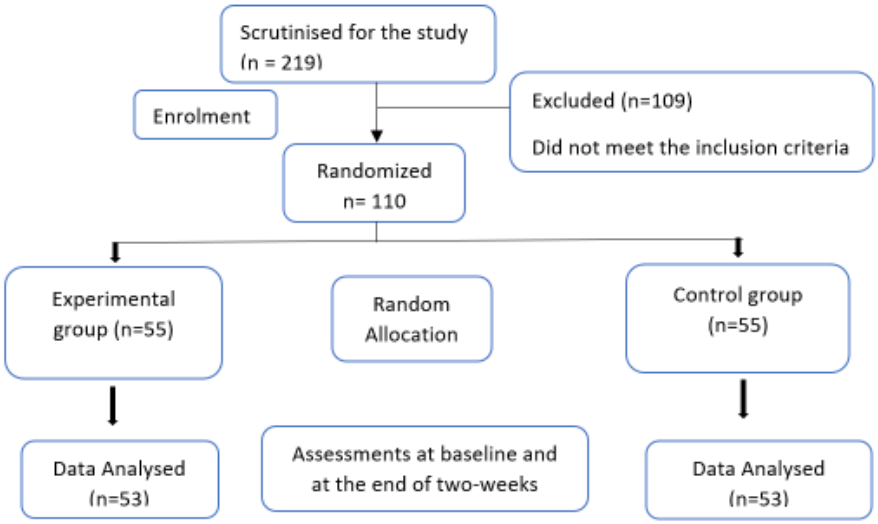


Figure 2: Schematic representation of the randomized controlled trial of Visual Strain & Psychological Well-being

5.2.2.3. Performance in CBTT:

The order of the three sessions (baseline, *trāṭaka*. and control) was randomized for each subject using random numbers generated using a computer program (www.randomizer.org). This was done to prevent the influence of the possible learning effect on the task.

CORSI BLOCK TAPPING TASK		
Baseline	*Trāṭaka* Session (20 min)	Control Session (20 min)

Figure 3: Schematic representation of the repeated measures of Corsi Block Tapping task

5.3. VARIABLES STUDIED

5.3.1. STUDY 1_AUTONOMIC & VISUAL REACTION TIME:

Heart Rate Variability (HRV) was used as the measure of the autonomic activity of the heart. For the assessment of HRV, an electrocardiogram (ECG) was recorded using 16- a channel human physiology system (PowerLab 16/35, ADInstruments, Australia). The digitized ECG data were analysed offline to obtain the heart rate variability (HRV) spectrum.

VISUAL REACTION TIME:

Visual reaction time was assessed using inquisit software version 4 (millisecond.com). The participants were asked to gaze at the monitor's fixation cross for performing the simple visual reaction time task. When a large circle (highlighting a red circle on a white background) appears, the participants were instructed to press a spacebar as soon as possible by using the right-hand index finger. The task runs two blocks of 20 trials each, and the total duration of the task is approximately 4 minutes to complete. The test assesses the mean reaction time.

5.3.1.1. RATIONALE FOR USE OF THE VARIABLES:

The variables mentioned reflecting the activity of the autonomic nervous activity autonomic nervous system. E.g., the HRV spectrum is believed to be a useful indicator of sympathetic activity (reflected by low frequency [LF] band power values) and parasympathetic activity (reflected by high frequency [HF] band power values) (Force, 1996).

5.3.1.2. SPECIFICATIONS OF POWER LAB:

The PowerLab 16/35 is a high-performance data acquisition system suitable for a wide range of research applications that require up to 16 input channels. Typical applications include

human and animal physiology. In addition to standard single-ended BNC inputs, the PowerLab 16/35 features 4 differential Pod ports that allow for direct connection of Pod signal conditioners and appropriate transducers. ECG was recorded using a standard bipolar limb lead II configuration. It was digitized using a 16-bit analog-to-digital converter at a sampling rate of 1 kHz and was analysed offline to obtain the HRV spectrum.

5.3.1.3. RECORDING CONDITION

The recording room in the research laboratory was sound attenuated and airconditioned to avoid thermal, visual, or auditory disturbance. The temperature of the recording room was maintained at 25±1 °C. The relative humidity during the time of the study was on average 52%. During both practice and assessments, the participants were seated comfortably, keeping the spine erect on a soft chair with a backrest.

5.3.1.4. ECG LEAD/Cuff POSITION:

The ECG was acquired using the limb Lead II system, i.e., the electrodes were placed on the right arm and left leg with the reference electrode placed on the right leg (Ashley & Niebauer, 2004). Respiration was recorded using a volumetric pressure transducer fixed around the trunk about 8 cm below the lower costal margin while the participants sat erect.-Skin Conductance was recorded using Ag/AgCl electrodes with electrode gel placed in contact with the volar surfaces of the distal phalanges of the index and middle fingers of the left hand. A low-level D.C. preamplifier was used, and a constant current of 10 μA was passed between the electrodes.

5.3.1.5. RECORDING PROCEDURE:

Participants were asked to avoid substances containing caffeine for the day preceding and the day of the recording since caffeine is known to influence cardiovascular functions (Whitsett, Manion, & Christensen, 1984) and autonomic Methods 98 responses (Zahn & Rapoport, 1987). Where this was unavoidable, the session was taken to another day. The recordings were taken

while the participants were seated with their eyes closed. The recordings were done before, during, and immediately following the *trāṭaka* and control sessions

5.3.1.6. VARIABLES STUDIED

a. Heart Rate Variability (HRV): ECG signals were recorded using 16 channel polygraphs (A.D. Instruments, Australia), using limb leads (Lead-I), at a sampling rate of 1 K Hz. The digital signals were inspected offline for artifacts. Artifact-free data were analysed for time domain, frequency domain, and non-linear changes.

b. Heart Rate: Heart rate was calculated using ECG recording. A 5-minute average heart rate was reported.

c. Respiratory Rate: Respiration was recorded using a volumetric pressure transducer fixed around the trunk about 8 cm below the lower costal margin, and the participant was erect.

d. Skin Conductance was recorded using Ag/AgCl electrodes with electrode gel placed in contact with the volar surfaces of the distal phalanges of the index and middle fingers of the left hand. A low-level D.C. preamplifier was used, and a constant current of 10 μA was passed between the electrodes.

e. Visual Reaction time: Visual reaction time was assessed using inquisit software version 4 (millisecond.com). The participants were asked to gaze at the monitor's fixation cross for performing the simple visual reaction time task. When a large circle (highlighting a red circle on a white background) appears, the participants were instructed to press a spacebar as soon as possible by using the right-hand index finger. The task runs two blocks of 20 trials each, and the total duration of the task is approximately 4 minutes to complete. The test assesses the mean reaction time.

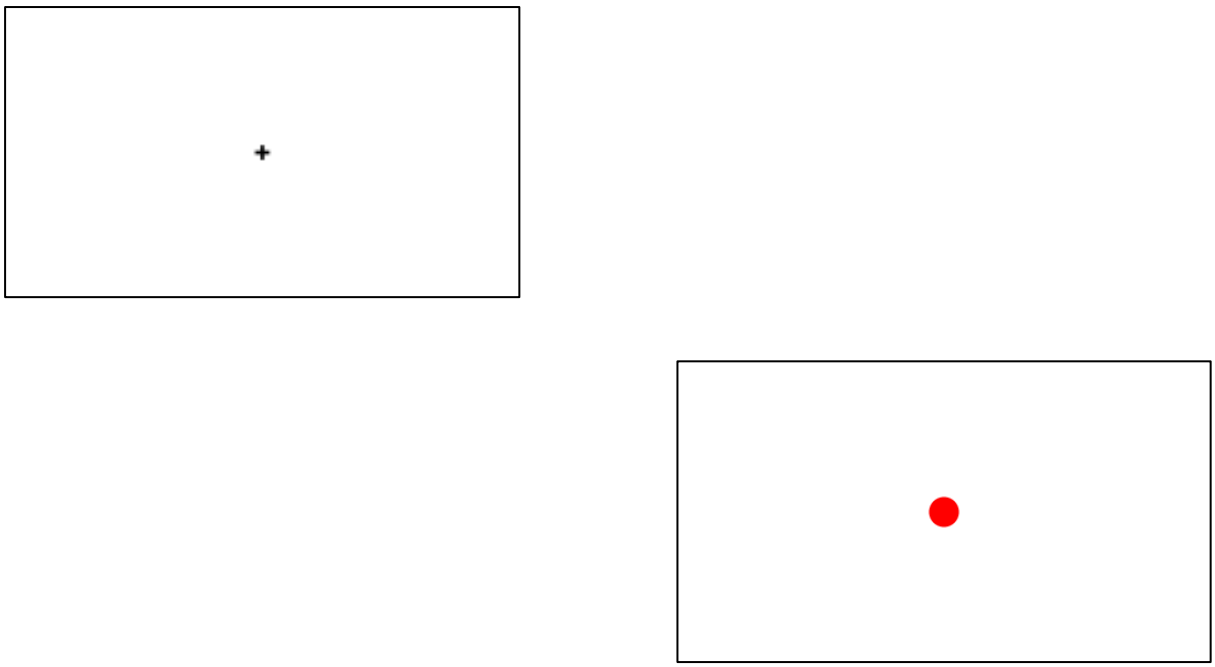


Figure 4: Illustrates of Simple Visual Reaction Time Task.

5.3.2. STUDY 2_VISUAL STRAIN & PSYCHOLOGICAL WELL-BEING:

5.3.2.1. RATIONALE FOR USE OF THE VARIABLES:

a. Mind-wandering questionnaire (MWQ): A reliable and validated five-item self-rated questionnaire, in which subjects were asked to fill up responses on a scale of 1 (almost never) to 6 (almost always); Cronbach's alpha = 0.850 (Mrazek et al., 2013).

b. State Mindfulness Attention Awareness Scale (SMAAS): A reliable and validated tool to assess state mindfulness was administered to subjects. The questionnaire contains five questions to be answered on a scale of 1 (not at all) to 6 (very much); Cronbach's alpha = 0.92 (Brown & Ryan, 2003).

c. Visual Fatigue Scale (VFS): It consists of six items: 1) I have difficulties in seeing; 2) I have a strange feeling around the eyes; 3) My eyes feel tired; 4) I feel numb; 5) I have a headache; 6) I feel dizzy looking at the screen. Each item was rated on a 10-point Likert scale. (Heuer et al., 1989)

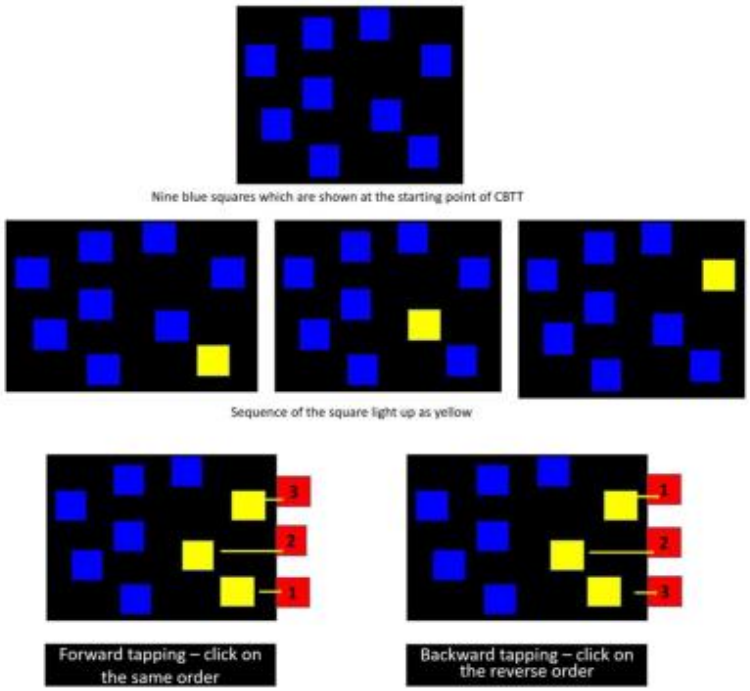
d. Self-reported Visual strain using a fatigue and Symptom assessment checklist (VSC): A specially designed checklist of the visual strain and fatigue symptoms was administered to the participants before and after two weeks of the practice of *trāṭaka* and control groups.

5.3.3. STUDY 3_ PERFORMANCE OF CBTT

5.3.3.1. RATIONALE FOR USE OF THE VARIABLES:

CBTT is a popular neuro-psychological task used to assess working and spatial memory. Nine blue squares appear on the screen. For each trial, the squares "light up" as yellow one by one in a varying sequence. After the presentation, the participants had to click each of the boxes in a similar order in which they had "lit up" the first part of the task, i.e., forward tapping. In the second part of the task, they maintained the reverse order, i.e., backward tapping (Roy P.C. Kessels et al., 2008). The task begins with a two-box sequence to a maximum of nine. The test gets terminated when the participant cannot remember the sequence for two consecutive trials at any one level. Hence, the test assesses the following four variables: (i) forward Corsi span, (ii) forward total score, (iii) backward Corsi span, and (iv) the backward total score.

Figure 5: Illustrates the forward and backward CBTT. Corsi Block Tapping Task: Forward and Backward



5.3.3.2. SPECIFICATIONS OF CORSI BLOCK TAPPING TASK:

The CBTT (Kessels et al., 2000; Kessels et al., 2008) was presented using the INQUISIT software package 4.0 (Millisecond Software, LLC, Seattle, USA) on a Dell desktop computer with a 21.5" color monitor. Uniform configuration was maintained for the computers on which the CBTT was presented to maintain the uniform processing speed. All participants received a practice session before the actual assessment session to familiarize themselves with the CBTT. The experiment was conducted individually in a room under standard fluorescent lighting in the research laboratory

5.3.3.3. VARIABLES STUDIED:

The test assesses the following four variables: (i) forward Corsi span, (ii) forward total score, (iii) backward Corsi span, and (iv) the backward total score.

5.4. INTERVENTION

We trained the participants in the procedure of *trāṭaka* (20 min/day for six days/week) for two weeks, during which the participants practiced *trāṭaka* using pre-recorded instruction.

5.4.1. EXPERIMENTAL GROUP/SESSION:

***Trāṭaka* group/session:** The *trāṭaka* module consists of 2 distinct stages, which were thought for 20 min. The first stage was done in about 5 minutes. As a preparatory stage of *trāṭaka* practice, eye exercise was done, which includes eyeballs in the horizontal, vertical, diagonal, and circular directions. These are performed with eyes open in a well-lit room.

The second stage was the practice of *trāṭaka* itself. The participants were asked to fix their gaze on the candle's flame for about 2 to 3 minutes without blinking their eyes. Then subjects were asked to visualize the candle flame in between eyebrows with closed eyes. This stage consists of about 15 minutes. This process was repeated for three rounds (simple focusing, intense & deep focusing for 5 min each), and practice was ended in silence with the prayer.

5.4.2. CONTROL SESSION:

During the control session, subjects practiced only eye exercises for 10 minutes, and for the next 10 minutes, they sat quietly with their eyes closed without doing any concentration or meditation.

5.4.3. CONTROL GROUP: Study 2: Visual Strain & Psychological Well-being:

The control group participants were asked to continue their routine daily activities for the follow-up duration of two weeks. Following the two weeks, they were offered the same intervention as *trāṭaka.*

5.4.4. ADVERSE EVENTS

For Study 2: Visual strain & psychological well-being: Participants of the study were encouraged to report any adverse effects to the investigators throughout the study. Other than two participants in the experimental group, who reported mild headaches following the practice of *Trāṭaka* on the first day, no adverse events were reported.

5.5. DATA EXTRACTION

5.5.1. DATA FROM POWERLAB 16/35:

The following data were extracted from the 16-channel polygraph. The heart rate in beats per minute was calculated by counting the R waves of the QRS complex in the ECG. Frequency, time domain, and non-linear domain analysis of HRV data were carried out using Lab Chart 8 (AD instruments, Australia) program, which uses the Lomb-Scargle Periodogram algorithm

5.5.1.1. TIME DOMAIN ANALYSIS:

The following components of time-domain HRV were analysed: (i) Meanrr (Mean of R.R. interval), (ii) SDNN (the standard deviation of N.N. intervals), (iii) the square root of the mean of the sum of the squares of differences between adjacent N.N. intervals (RMSSD), (iv) the proportion derived by dividing NN50 by the total number of N.N. intervals (pNN50)

5.5.1.2. FREQUENCY DOMAIN ANALYSIS:

The frequency domain of HRV analysis was carried out. The energy in the HRV series in the following specific frequency bands was studied viz., Low frequency (L.F.) band (0.04–0.15 Hz) and

high frequency (H.F.) band (0.15–0.5 Hz). According to guidelines, L.F. and H.F. band values were expressed as normalized units. The LF/HF ratio was also calculated.

5.5.1.3. NON-LINEAR DOMAIN ANALYSIS:

The non-linear domain of HRV performed: Poincaré plots were used to measure the standard deviation (S.D.) of short term (SD1) and long term (SD2) HRV, which measure the unpredictability of the R.R. time series

5.5.1.4. RESPIRATORY RATE:

The respiratory rate in cycles per minute was continuously calculated by counting the breath cycles in 60 s epochs.

5.5.1.5. SKIN CONDUCTANCE:

Skin Conductance was recorded using Ag/AgCl electrodes with electrode gel placed in contact with the volar surfaces of the distal phalanges of the index and middle fingers of the left hand. A low-level D.C. preamplifier was used, and a constant current of 10 lA was passed between the electrodes.

5.5.1.6. SIMPLE VISUAL REACTION TIME TASK:

Simple Visual Reaction time: It was expressed in milliseconds. After completing the Visual reaction time task, the mean reaction time in ms was recorded for each subject.

5.5.2. DATA FROM VISUAL STRAIN & PSYCHOLOGICAL WELL-BEING:

For VFS, VSC, and MWQ, an average of all scores on the Likert scale was calculated and reported. For SMAAS: reverse scoring was performed for all items, and an average of all five values was calculated for the final score.

5.5.3. DATA FROM THE CORSI BLOCK TAPPING TASK:

The number scores the result of CBTT in the maximum sequence that the subject will reproduce correctly, giving a maximum possible score of nine. The result of CBTT is scored by the number in the maximum sequence (score 9) that the subject will be able to reproduce correctly

Variables were extracted:

- Forward & backward Corsi span
- Forward & backward total score

5.6. DATA ANALYSIS

5.6.1. AUTONOMIC VARIABLES & VISUAL REACTION TIME:

1.1.1. The data were tabulated in Microsoft Excel version 2016, and data analyses were performed using JASP statistical package version 0.14.1 (https://jasp-stats.org). The data were tested for normality, and repeated measures analysis of variance (RM ANOVA) for within-subjects effects were analysed. Post hoc corrections were done using Holm's method for checking the differences between sessions

5.6.2. VISUAL STRAIN AND PSYCHOLOGICAL WELL-BEING:

Data analysis was done in JASP statistical package version 0.14.1 33. The data were extracted using questionnaire manuals and organized in Microsoft Excel version 2016. Data were analyzed for normality using Shapiro-Wilk's test and were found to be not normally distributed. Thus, the Mann-Whitney U test was performed to compare the differences between groups. Wilcoxon Signed Rank test was performed for the within-group changes, and Spearman's rho was evaluated to determine correlations between the variables.

5.6.3. PERFORMANCE IN CORSI BLOCK TAPPING TASK:

The data were tabulated, and data analyses were performed using JASP statistical package version 0.14.1 (https://jasp-stats.org). The data were tested for normality and repeated measures analysis of variance (RM ANOVA) for within-subject's effects. Post hoc corrections were done using Holm's method for checking the differences between sessions.