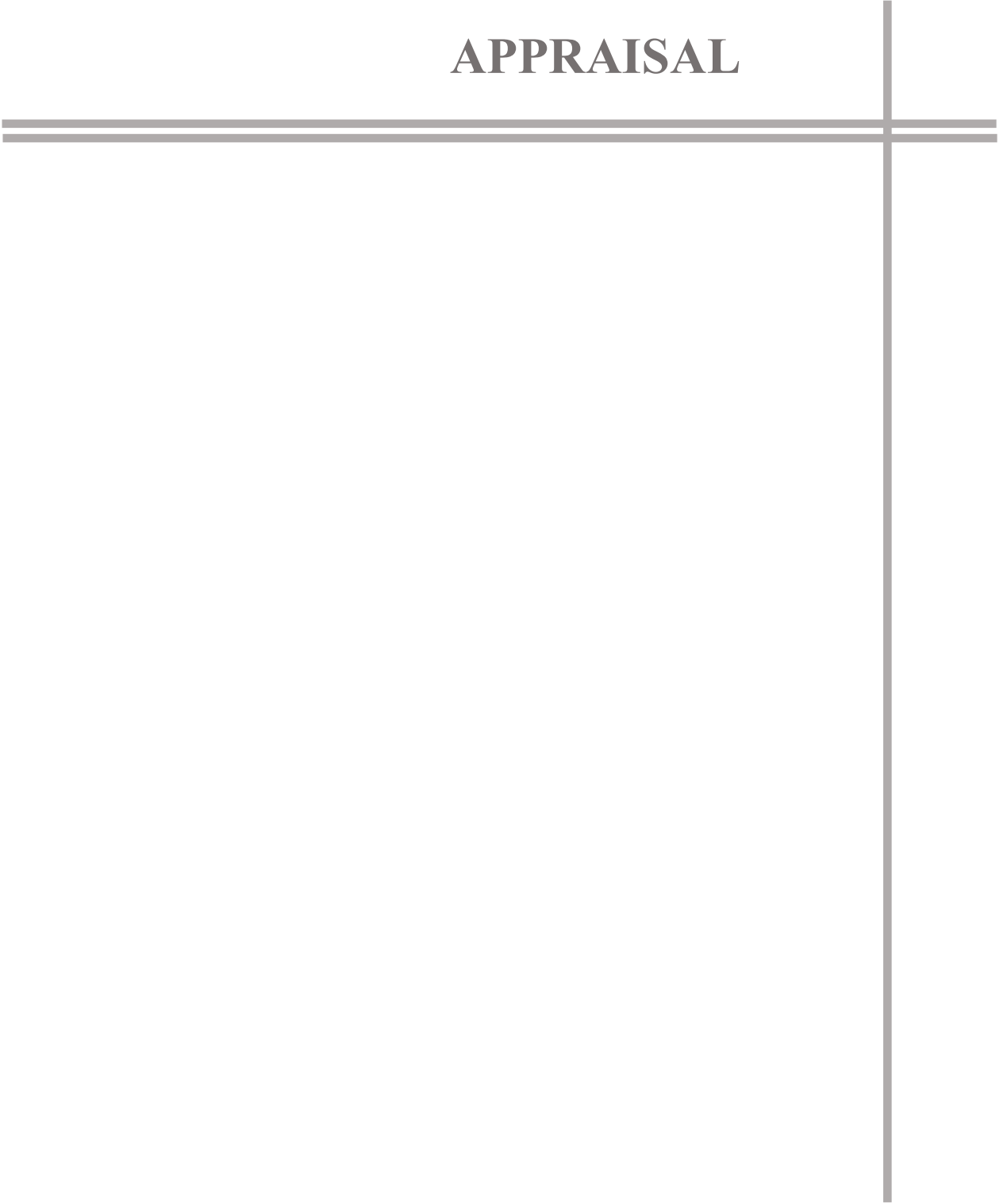


# APPRAISAL



## **8.0 APPRAISAL**

### **8.1 SUMMARY OF THE FINDINGS**

The yoga group showed improvement in working memory performance, namely accuracy and reaction time in high load task condition (2-back). A higher oxygenation level in the PFC region was associated with improved accuracy and reaction time. This indicates that yoga enhances cerebral oxygenation and improves cognitive performance. Also, yoga improves cardiac autonomic functions involving reduced heart rate, reduction in LF and increase in HF components. Rumination was reduced with yoga practice and influenced the cognitive performance of yoga participants. The study concluded that yoga can improve cognitive function and alleviate depression symptoms.

### **8.2 CONCLUSIONS**

The findings suggest that yoga practice may improve working memory performance associated with higher PFC oxygenation in patients with T2DM. Also, yoga may prevent the onset of a depressive condition by reducing rumination symptoms and influences positively on cognitive functions. Yoga practice may be an effective adjunct approach for enhancing cognitive functions in clinical populations.

### **8.3 IMPLICATIONS OF THE STUDY**

This study further confirmed the effectiveness of yoga in improving cognitive functions in T2DM patients. In other clinical populations, yoga may also have a potential role in improving working memory functions. Also, yoga may prevent the onset of a depressive condition by reducing rumination symptoms.

### **8.4 APPLICATIONS OF THE STUDY**

It is possible to conduct similar studies in the T2DM population addressing other cognitive domains. Also, similar studies can be done in other clinical populations to examine yoga's role in improving cognitive functions. This study found that yoga can be a safe adjunct method for treating cognitive dysfunction in a clinical population.

## **8.5 STRENGTH OF THE STUDY**

- The first study to examine the effect of yoga on working memory in T2DM patients
- T2DM specific yoga protocol was used in the study
- Non-invasive methods were used for the assessment
- The first study to examine the effect of yoga on rumination in T2DM patients

## **8.6 LIMITATIONS OF THE STUDY**

This study had a small sample size and participants with a wide age range. Future studies should include a larger sample of older participants who are at higher risk of cognitive impairment. This study was conducted without the use of short separation channels in fNIRS measurement. The use of short separation channels would have made the measurement more robust to systemic physiological noises and improved signal quality.

## **8.7 SUGGESTIONS FOR THE FUTURE STUDIES**

The duration of the yoga intervention may influence the outcome of the study. Therefore, it is necessary to conduct the study over a longer period in order to determine the extent to which the practice of yoga has an effect. Also, further study is needed with a focus on the dose-response relationship of yoga practice to ascertain the optimum intervention.

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# APPENDICES



## APPENDIX 1 – INSTITUTIONAL ETHICAL COMMITTEE APPROVAL



# स्वामी विवेकानन्द योग अनुसंधान संस्थान Swami Vivekananda Yoga Anusandhāna Samsthāna

(Declared as Deemed-to-be University under Section 3 of the UGC Act, 1956)

Ekmath Bhavan, # 19, Gavipuram Circle, Kempegowda Nagar, Bangalore - 560 019

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E-mail: svyasa@svyasa.org Website: www.svyasa.org

RES/IEC-SVYASA/109/2017

02 December 2017

To,  
Dr. Deepeshwar Singh,  
Assistant Professor,  
Division of Yoga and Life Sciences,  
S-VYASA University,  
Bengaluru.

Reference:

"Neuronal Activity, Cerebral Blood Flow & Hemodynamic Responses of Brain Associated with Cognition Following Yoga Practices In Diabetes Patients". - Committee Approval of the above mentioned study.

**Dear Dr. Deepeshwar Singh,**

We have received from you the following study related documents vide your letter dated 14 September 2017

1	Project Proposal
2	Informed consent form

Ethics committee meeting was held on **16 September 2017** between 2:00 PM and 5:00 PM at Ekmath Bhavan, Bengaluru. Above documents were examined and discussed in the meeting. After due consideration, the committee has decided to approve conducting the aforementioned study.



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## APPENDIX 2 – CLINICAL TRIAL REGISTRATION

### FULL DETAILS (Read-only)

<b>CTRI Number</b>	CTRI/2017/12/010936 [Registered on: 21/12/2017] <b>Trial Registered Prospectively</b>	
<b>Last Modified On:</b>	19/12/2017	
<b>Post Graduate Thesis</b>	No	
<b>Type of Trial</b>	Interventional	
<b>Type of Study</b>	Yoga & Naturopathy	
<b>Study Design</b>	Randomized, Parallel Group, Active Controlled Trial	
<b>Public Title of Study Modification(s)</b>	Cognitive functions in Type-2 Diabetes Patients following yoga practice	
<b>Scientific Title of Study</b>	Neuronal activity, Cerebral Blood Flow & Hemodynamic Responses of Brain associated with Cognition following Yoga Practices in Diabetes Patients- a randomized controlled trial.	
<b>Secondary IDs if Any</b>	Secondary ID	Registry
	NIL	NIL
<b>Details of Principal Investigator or overall Trial Coordinator (multi-center study)</b>	<b>Name</b>	Deepeshwar Singh
	<b>Address</b>	S-VYASA, #19 Eknath Bhavan, Gavipuram Circle, K.G. NAGAR
		Bangalore
		KARNATAKA
		560019 India
	<b>Phone</b>	9036367402
<b>Fax</b>		
<b>Email</b>	deepeshwar.singh@gmail.com	
<b>Details Contact Person Scientific Query</b>	<b>Name</b>	Deepeshwar Singh
	<b>Address</b>	S-VYASA, #19 Eknath Bhavan, Gavipuram Circle, K.G. NAGAR
		KARNATAKA
		560019
		India
	<b>Phone</b>	9036367402
<b>Fax</b>		
<b>Email</b>	deepeshwar.singh@gmail.com	
<b>Details Contact Person Public Query</b>	<b>Name</b>	Deepeshwar Singh
	<b>Address</b>	S-VYASA, #19 Eknath Bhavan, Gavipuram Circle, K.G. NAGAR
KARNATAKA		

## APPENDIX 3 – INFORMED CONSENT FORM

### INFORMED CONSENT FORM

**Title of the project:** Exploring the yoga benefits of cognitive improvement and metabolic mediator of neuro-endocrine biomarkers in patients with type 2 DM

**Investigator:** Dr. Vidyashree, Mr. Chadanand Kaligal, Mr. Amit kanthi, and Mr. Krishna

**Name of the Guides:** Dr. Deepeshwar Singh, Prof. Ramesh Mavathur, Dr. M Balasubramayam] and Prof. Manjunath N.K.

**Name of the Participant** :

**Date and Time** : \_\_\_\_\_ and \_\_\_\_\_

#### **About the Project:**

In order to understand the changes in neurocognitive function type 2 DM patients will be assessed in three cognitive tasks day 1, Day 45, and Day 90 following Yoga, exercise and conventional treatment. The assessments will be done using non-invasive methods (i) electroencephalography (EEG), (ii) functional near infrared spectroscopy (fNIRS), (iii) Transcranial Doppler (TCD), and (iv) 8.5 ml blood will be collected.

All the techniques are non-invasive except blood collection.

IEC of SVYASA and CTRI, Govt. of India have registered the protocol with reference no. (IEC: RES/ICE-SVYASA/109/2017; CTRI: CTRI/2017/12/016338)

Please note:

1. All information obtained during the study will be kept confidential and individual report of the test will be given.
2. You can withdraw from the study at any point of time unconditionally.
3. In case the study does cause any adverse effects, the institution is not liable.

I hereby have understood the above and consent voluntarily to participate in the study.

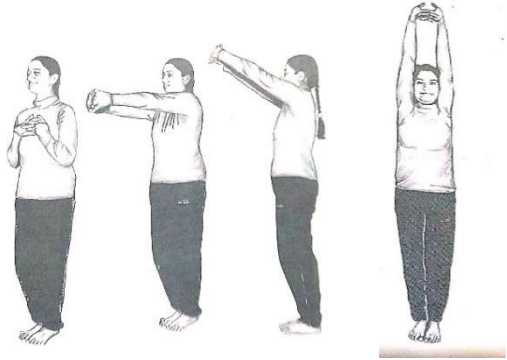


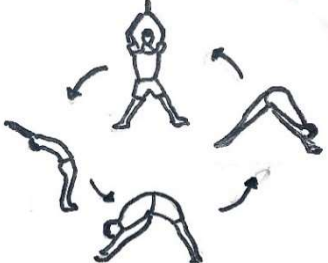
Place \_\_\_\_\_

Date \_\_\_\_\_

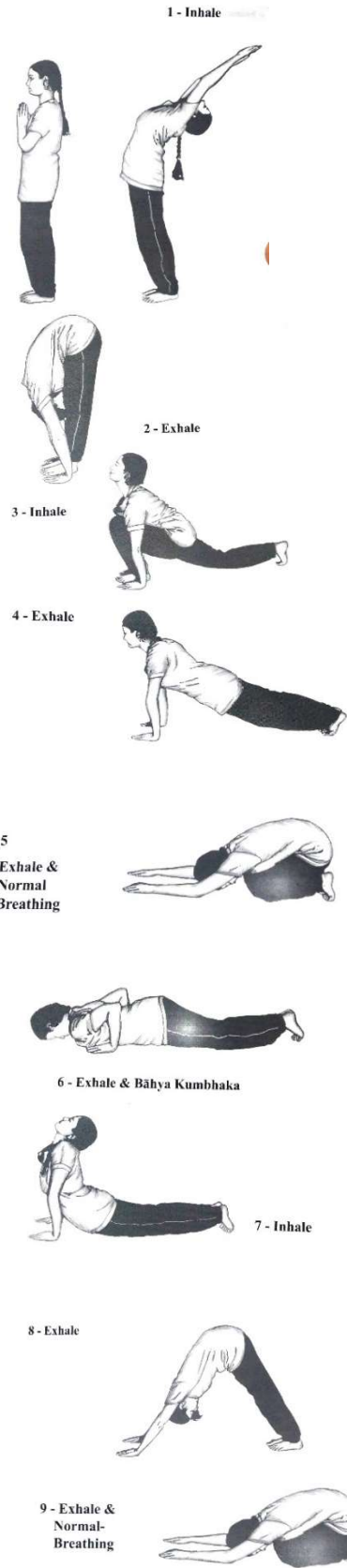
**Signature of the Investigator**

**Signature of the participant**

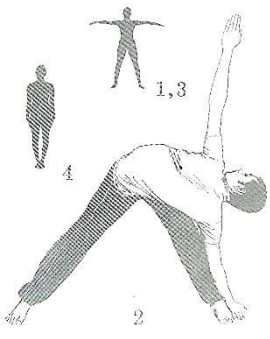
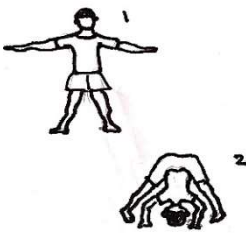
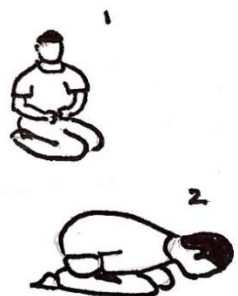

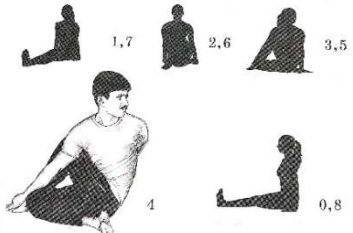
## APPENDIX 4 – ILLUSTRATION OF YOGA PRACTICES

Sl.No.	Name of the Practice	Illustration
1	Starting prayer	Om Saha navavatu, Saha nau bhunaktu, Saha Vīryam karavāvai, Tejasvi nāvadhītastu Mā vidviśāvahai. Om Śāntiḥ Śāntiḥ Śāntiḥ
2	Preparatory Practices ( <i>SukshmaVyayamas</i> and <i>Shithilakarana</i> )	
a	<i>Urdhva-hasta Shvasana</i> (hand stretch breathing 3 rounds at 90°, 135°, 180° each)	
b	<i>Kati-Shakti Vikasaka</i> (3 rounds each)	
	Forward and backward bending	
	Twisting	
c	<i>Sarvanga Pushti</i> (clockwise and anticlockwise – 3 rounds each)	
3	<i>Surya Namaskara</i>	
a	10 steps (fast mode) 6 rounds	Refer below (Steps 5 and 9 are not included)

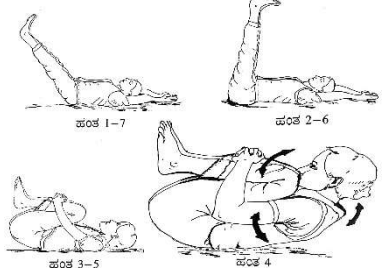
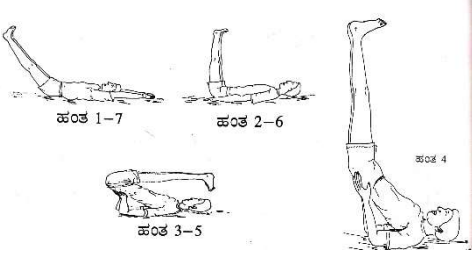
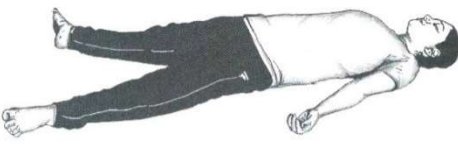
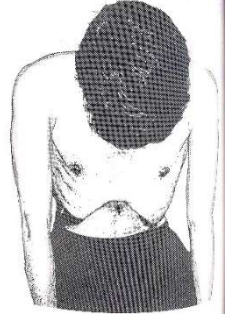

12 step (slow mode) 1 round  
 (a and b to be avoided by those with  
 knee pain, cardiac problems, renal  
 problems, low back pain, retinopathy  
 and the elderly who are weak and  
 not flexible; instead, they can do  
 Chair Surya Namaskara, a modified  
 version: 7 rounds






		<p>10 - Inhale</p> <p>11 - Exhale</p> <p>12 - Inhale</p>
4	<i>Asanas</i> (1 min per asana)	
a	Standing (1 min per asana)	
	<i>Trikonasana</i>	<p>1, 3</p> <p>2</p> <p>4</p>

	<p>, <i>Pravritta Trikonasana,</i></p>	
	<p><i>Prasarita pada-hastasana</i></p>	
<p>b</p>	<p>Sitting</p>	
	<p><i>Mandukasana,</i></p>	
	<p><i>Vakrasana</i></p>	
	<p><i>Ardhamatsyendrasana</i></p>	

	<i>Paschimatanasana</i>	
	<i>ArdhaUshtrasana</i>	
c	Prone	
	<i>Bhujangasana,</i>	
	<i>Dhanurasana followed by Pavanmuktasana</i>	
d	Supine	
	<i>Jathara Parivartanasana</i>	

	<i>Pavanamuktasana</i>	
	<i>Viparitakarani</i>	
	In the end, relaxation with abdominal breathing in the supine position ( <i>vishranti</i> ), 10-15 rounds (2 min)	
5	<i>Kriyas</i>	
	<i>Agnisara</i> : 1 min	
	<i>Kapalabhati</i> (at 60 breaths per minute for 1 min followed by rest for 1 min)	
6	<i>Pranayama</i>	

a	<i>Nadishuddhi</i> (for 6 min, with <i>antarkumbhaka</i> and <i>jalandharbandha</i> for 2 s)	
b	<i>Bhramari</i> (3 min)	
7	<i>Meditation</i> (for stress management for deep relaxation)	
8	Resolve (I am completely healthy)	
9	Closing prayer	<p><b>Om sarve bhavantu sukhinah sarve santu nirāmayah, Sarve bhadraṇi paśyantu mā kaścit duḥkhabhāg bhavet Om Śāntiḥ Śāntiḥ Śāntiḥ</b></p>

## APPENDIX 5 – QUESTIONNAIRES

### 5.1 RUMINATION RESPONSE SCALE

#### Rumination Scale

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you *generally* do, not what you think you should do.

Almost never      Sometimes      Often      Almost Always

1. Think about how alone you feel
2. Think “I won’t be able to do my job if I don’t snap out of this”
3. Think about your feelings of fatigue and achiness
4. Think about how hard it is to concentrate
5. Think “What am I doing to deserve this?”
6. Think about how passive and unmotivated you feel.
7. Analyze recent events to try to understand why you are depressed
8. Think about how you don’t seem to feel anything anymore
9. Think “Why can’t I get going?”
10. Think “Why do I always react this way?”
11. Go away by yourself and think about why you feel this way
12. Write down what you are thinking about and analyze it

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 13. Think about a recent situation, wishing it had gone better          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Think “I won’t be able to concentrate if I keep feeling this way.”  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Think “Why do I have problems other people don’t have?”             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Think “Why can’t I handle things better?”                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Think about how sad you feel.                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Think about all your shortcomings, failings, faults, mistakes       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Think about how you don’t feel up to doing anything                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Analyze your personality to try to understand why you are depressed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Go someplace alone to think about your feelings                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Think about how angry you are with yourself                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## 5.2 PERSEVERATIVE THINKING QUESTIONNAIRE

### Perseverative Thinking Questionnaire

Instruction: In this questionnaire, you will be asked to describe how you typically think about negative experiences or problems. Please read the following statements and rate the extent to which they apply to you when you think about negative experiences or problems.

	Never	rarely	sometimes	often	almost always
1. The same thoughts keep going through my mind again and again.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Thoughts intrude into my mind.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I can't stop dwelling on them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think about many problems without solving any of them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I can't do anything else while thinking about my problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. My thoughts repeat themselves.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Thoughts come to my mind without me wanting them to.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I get stuck on certain issues and can't move on.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I keep asking myself questions without finding an answer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. My thoughts prevent me from focusing on other things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I keep thinking about the same issue all the time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Thoughts just pop into my mind.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I feel driven to continue dwelling on the same issue.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. My thoughts are not much help to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. My thoughts take up all my attention.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 5.3 MONTREAL COGNITIVE ASSESSMENT

**MONTREAL COGNITIVE ASSESSMENT (MOCA®)**  
Version 8.1 English

Name: \_\_\_\_\_ Education: \_\_\_\_\_ Date of birth: \_\_\_\_\_  
Sex: \_\_\_\_\_ DATE: \_\_\_\_\_

VISUOSPATIAL / EXECUTIVE		Copy cube					Draw CLOCK ( Ten past eleven ) ( 3 points )			POINTS		
							<input type="checkbox"/> Contour <input type="checkbox"/> Numbers <input type="checkbox"/> Hands			___/5		
NAMING												
										___/3		
MEMORY		Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.					FACE	VELVET	CHURCH	DAISY	RED	NO POINTS
		1 <sup>ST</sup> TRIAL										
		2 <sup>ND</sup> TRIAL										
ATTENTION		Read list of digits ( 1 digit/ sec. ). Subject has to repeat them in the forward order. [ ] 2 1 8 5 4					Subject has to repeat them in the backward order. [ ] 7 4 2					___/2
		Read list of letters. The subject must tap with his hand at each letter A. No points if = 2 errors					[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B					___/1
		Serial 7 subtraction starting at 100. [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65					4 or 5 correct subtractions: 3 pts. 2 or 3 correct: 2 pts. 1 correct: 1 pt. 0 correct: 0					___/3
LANGUAGE		Repeat: I only know that John is the one to help today. [ ]					The cat always hid under the couch when dogs were in the room. [ ]					___/2
		Fluency: Name maximum number of words in one minute that begin with the letter F. [ ] _____ (N = 11 words)										___/1
ABSTRACTION		Similarity between e.g. banana - orange = fruit [ ] train - bicycle [ ] watch - ruler										___/2
DELAYED RECALL		(MIS)	Has to recall words WITH NO CUE	FACE	VELVET	CHURCH	DAISY	RED	Points for UNCUEDE recall only		___/5	
		X3		[ ]	[ ]	[ ]	[ ]	[ ]				
		X2	Category cue									
		X1	Multiple choice cue						MIS = ___/15			
ORIENTATION		[ ] Date		[ ] Month	[ ] Year	[ ] Day	[ ] Place	[ ] City	___/6			
© Z. Nasreddine MD		www.mocatest.org					MIS: /15 (Normal = 26/30)		TOTAL			___/30
Administered by: _____		Training and Certification are required to ensure accuracy					Add 1 point if = 12 yr edu					

## 5.4 SYMPTOM CHECKLIST 90 REVISED

Study \_\_\_\_\_

ID \_\_\_\_\_  
Date \_\_\_\_/\_\_\_\_/\_\_\_\_

### Symptom Checklist 90-R

Below is a list of problems and complaints that people sometimes have. Please read each one carefully and **enter the number** that best describes how much you were bothered by that problem during the past week.

**Please enter only ONE.**

**FOR THE PAST WEEK, HOW MUCH WERE YOU BOTHERED BY:**

	Not At All	A Little Bit	Moderately	Quite A Bit	Extremely
1. Headaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Nervousness or shakiness inside	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Unwanted thoughts, words, or ideas that won't leave your mind	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Faintness or dizziness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Loss of sexual interest or pleasure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Feeling critical of others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. The idea that someone else can control your thoughts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Feeling others are to blame for most of your troubles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Trouble remembering things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Worried about sloppiness or carelessness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Feeling easily annoyed or irritated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Pains in heart or chest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Feeling afraid in open spaces or on the streets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Feeling low in energy or slowed down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Thoughts of ending your life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Hearing words that others do not hear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Trembling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Feeling that most people cannot be trusted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Poor appetite	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Crying easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Study \_\_\_\_\_

ID \_\_\_\_\_  
Date \_\_\_\_/\_\_\_\_/\_\_\_\_

**FOR THE PAST WEEK, HOW MUCH WERE YOU BOTHERED BY:**

	Not At All	A Little Bit	Moderately	Quite A Bit	Extremely
21. Feeling shy or uneasy with the opposite sex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Feeling of being trapped or caught	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Suddenly scared for no reason	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Temper outbursts that you could not control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Feeling afraid to go out of your house alone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Blaming yourself for things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Pains in lower back	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Feeling blocked in getting things done	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Feeling lonely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Feeling blue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Worrying too much about things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Feeling no interest in things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Feeling fearful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Your feelings being easily hurt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Other people being aware of your private thoughts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Feeling others do not understand you or are unsympathetic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Feeling that people are unfriendly or dislike you	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Having to do things very slowly to insure correctness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Heart pounding or racing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Nausea or upset stomach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Feeling inferior to others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Soreness of your muscles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Feeling that you are watched or talked about by others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Trouble falling asleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**FOR THE PAST WEEK, HOW MUCH WERE YOU BOTHERED BY:**

	Not At All	A Little Bit	Moderately	Quite A Bit	Extremely
45. Having to check and double-check what you do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Difficulty making decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Feeling afraid to travel on buses, subways, or trains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Trouble getting your breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Hot or cold spells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. Having to avoid certain things, places, or activities because they frighten you	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Your mind going blank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Numbness or tingling in parts of your body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. A lump in your throat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Feeling hopeless about the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Trouble concentrating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Feeling weak in parts of your body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Feeling tense or keyed up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Heavy feelings in your arms or legs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Thoughts of death or dying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Overeating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61. Feeling uneasy when people are watching or talking about you	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Having thoughts that are not your own	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. Having urges to beat, injure, or harm someone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64. Awakening in the early morning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65. Having to repeat the same actions such as touching, counting, washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66. Sleep that is restless or disturbed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67. Having urges to break or smash things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68. Having ideas or beliefs that others do not share	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Study \_\_\_\_\_

ID \_\_\_\_\_  
Date \_\_\_\_/\_\_\_\_/\_\_\_\_

**FOR THE PAST WEEK, HOW MUCH WERE YOU BOTHERED BY:**

	Not At All	A Little Bit	Moderately	Quite A Bit	Extremely
69. Feeling very self-conscious with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70. Feeling uneasy in crowds, such as shopping or at a movie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71. Feeling everything is an effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
72. Spells of terror or panic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73. Feeling uncomfortable about eating or drinking in public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74. Getting into frequent arguments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75. Feeling nervous when you are left alone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76. Others not giving you proper credit for your achievements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
77. Feeling lonely even when you are with people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
78. Feeling so restless you couldn't sit still	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
79. Feelings of worthlessness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
80. Feeling that familiar things are strange or unreal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
81. Shouting or throwing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
82. Feeling afraid you will faint in public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
83. Feeling that people will take advantage of you if you let them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
84. Having thoughts about sex that bother you a lot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
85. The idea that you should be punished for your sins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
86. Feeling pushed to get things done	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
87. The idea that something serious is wrong with your body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
88. Never feeling close to another person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
89. Feelings of guilt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
90. The idea that something is wrong with your mind	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## APPENDIX 6 – LIST OF PUBLICATIONS FROM THIS DOCTORAL THESIS

1. **Kaligal, C.**, Kanthi, A., Vidyashree, M., Krishna, D., Raghuram, N., Hongasandra Ramarao, N., & Deepeshwar, S. (2023). Prefrontal oxygenation and working memory in patients with type 2 diabetes mellitus following integrated yoga: a randomized controlled trial. *Acta Diabetologica*, 60(7), 951-961.
2. **Kaligal, C.**, Kanthi, A., Mahadevappa, V., & Deepeshwar, S. (2022). Influence of Yoga on Cognitive Functions in Individuals with Mental Disorders: A Systematic Review of Randomized Controlled Trials. *Integrative and Complementary Therapies*, 29(1), 15-24.
3. **Chidananda, K.**, Singh, D., Amit, K., Mahadevappa, V., & Krishna, D. (2023). Yoga Practice Facilitates Prefrontal Oxygenation and Working Memory in Type 2 Diabetes Mellitus Patients: A Pilot Study. *Advances in mind-body medicine*, 37(2), 24-31.