

**EFFECT OF SURYANAMASKARA ON HIGH SCHOOL STUDENTS FOR  
IMPROVING MEMORY AND CONCENTRATION**

**TOWARDS**

**Partial fulfillment of Master degree in Yoga Therapy (MSc.YT)**

**SUBMITTED BY**

**HEMAL ANIL ASHAR**

**Under the Guidance of**

**Dr. BALARAM PRADHAN (PhD)**



**Swami Vivekananda Yoga Anusandhana Samsthana  
No.19, Eknath Bhavan, Gavipuram Circle, Kempegowdanagar,  
Bangalore-560019 India. Website: [www.svyasa.org](http://www.svyasa.org)**

## **CERTIFICATE**

This is to certify that **HEMAL A. ASHAR** is submitting this Experimental Research on **EFFECT OF SURYANAMASKARA ON HIGH SCHOOL STUDENTS FOR IMPROVING MEMEORY AND CONCENTRATION** in partial fulfillment of the requirement for the Master of Science (Yoga Therapy) registered in **SWAMI VIVEKANANDA YOGA ANUSANANDANA SAMSTHANA (SVYASA UNIVERSITY) BANGALURU** and this a record of the work carried out by her in thus institution.

**Date:**

**Place: Bangalore.**

**Guide name:**

**Dr. BALARAM PRADHAN**

## **DECLARATION**

I, hereby declared that this study was conducted by me at Swami Vivekananda Yoga Anusandhana Samsthana (SVYASA), Bangalore, under the guidance of Dr. BALARAM PRADHAN , SVYASA University, Bangalore.

I also declare that the subject matter of my dissertation entitled “ EFFECT OF SURYANAMASKARA ON HIGH SCHOOL STUDENTS FOR IMPROVING MEMEORY AND CONCENTRATION” has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.

**Date:**

**Place: Bangalore.**

**HEMAL A. ASHAR**

**Candidate:**

## **ACKNOWLEDGEMENT**

I would like to express the deepest gratitude to my guide, Dr. BALARAM PRADHAN for his guidance and encouragement. I am unable to express his contribution in my development through words. My sincere gratitude to management and faculty of Swami Vivekananda Yoga University who provided me valuable opportunity for conducting my research work.

I thank all the members of the faculty and my friends for their help at different stages of their work and I also would like to thank the entire students involved in my research with lot of cooperation throughout my study.

I will be always grateful to my university Swami Vivekananda Yoga Anusandhana Samsthana (SVYASA) and D.J.Doshi Gurukul College Of Commerce for its support in promoting my career.

I am indebted to my parents for their inspiration, love and support.

Finally, I thank that unseen divine without whose wish, this work wouldn't have been possible.

**Date:**

**Place: BANGLORE**

**HEMAL A. ASHAR**

**Candidate:**

**STANDARD INTERNATIONAL TRANSLITERATION CODE USED TO  
TRANSLITERATE SANSKRIT WORDS**

a =	अ	ña =	ङ	pa =	प
ā =	आ	ca =	च	pha =	फ
i =	इ	cha =	छ	ba =	ब
ī =	ई	ja =	ज	bha =	भ
u =	उ	jha =	झ	ma =	म
ū =	ऊ	ñ =	ञ	ya =	य
ṛ =	ऋ	ṭa =	ट	ra =	र
ṝ =	ॠ	ṭha =	ठ	la =	ल
e =	ए	ḍa =	ड	va =	व
ai =	ऐ	ḍha =	ढ	śa =	श
o =	ओ	ṇa =	ण	ṣa =	ष
au =	औ	ta =	त	sa =	स
m̐ =	अं	tha =	थ	ha =	ह
ḥ =	अः	da =	द	kṣa =	क्ष
ka =	क	dha =	ध	tra =	त्र
kha =	ख	na =	न	jña =	ज्ञ
	ga =	ग	gha =	घ	

## **ABSTRACT:**

1. Title: Effect of Suryanamaskara on high school students on Improving memory and concentration.
2. Aim: To study 15 days Suryanamaskara practice increases memory and concentration in high school students.
3. Methodology: Eighty students of age group 14 to 16 were participated in this study. In both the groups there were 18 boys and 22 girls. The yoga intervention group consists of 18 male and 22 female with for intervention of Suryanamaskara. The control group consisted of 18male and 22femals. The study was conducted for 45minutes for each working day for 15 days. The test design consisted of between group design setup. The intervention consist of Loosing Practices for 15 minutes, Set of Suryanamaskara followed by Deep Relaxation Technique(DRT) for 10 minutes.
4. Results: The result showed statistically significant ( $p < 0.05$ ) change in all scales which include WMS and SLCT. In both the group there were improvement but in yoga group there was more improvement in WMS which indicates that the memorizing capacity of students were highly increased in yoga group with the help of Suryanamaskara practice as compared to non-yoga group which was also undergoing same condition like yoga group.
5. Conclusion: Suryanamaskara helps to improve cognitive functions like memory and concentration if practice daily. Even it helps to improve blood pressure and flexibility of individual. This practice helps to increase the memorizing capacity of students which helps students to improve their memory and will result in scoring good in their exam.
6. Key words: Suryanamaskara, memory, concentration, SLCT, WMS.

## TABLE OF CONTENTS:

### Contents

CHAPTER 1: INTRODUCTION .....	10
1.1 Concept of Yoga:.....	10
1.2 Concept of Rāja Yoga: .....	11
1.3 Concept of Āsana: .....	11
1.4 Suryanamaskara:.....	11
1.4.1 Steps of Suryanamaskara according to Bihar School of Yoga with Meaning, Breathing and different chakras: .....	13
1.4.2 Procedure of Asana in Suryanamaskara: .....	14
1.4.3 Suryanamaskara mantras with meaning : .....	20
1.4.4 Benefits of Suryanamaskara practices: .....	20
1.5 Physiological effect of Suryanamaskara on Body:.....	21
I. EFFECT OF MUSCULO-SKELETAL SYSTEM:.....	21
II. EFFECT ON RESPIRATORY SYSTEM: .....	21
III. EFFECT ON CARDIOVASCULAR SYSTEM: .....	21
IV. EFFECT ON ENDOCRINE SYSTEM: .....	21
V. EFFECT ON NERVOUS SYSTEM:.....	21
VI. EFFECT ON GASTROINTESTINAL SYSTEM: .....	21
1.6 Memory:.....	22
1.6.1 Following are the different types of memories: .....	22
1.6.2 Yoga to improve memory: .....	23
1.7 Concentration : .....	23
1.7.1 Yoga to improve Concentration: .....	23
CHAPTER 2: SCIENTIFIC LITERATURE REVIEW .....	24
ABBREVIATION.....	30
CHAPTER 3: REVIEW OF ANCIENT LITERATURE.....	31
3.1 Definitions of yoga according to ancient texts:.....	31
3.1.1 Yoga according to Pātanjali:.....	31
3.1.2 Yoga according to yoga vasista:.....	31
3.1.3 Yoga according to Bhagavad Gita:.....	31
3.2 Sun according to various scriptures:.....	31

3.2.1	According to RGVEDA:.....	31
3.2.2	According to ISVASYOPANISHAD : .....	32
3.2.2	Other Texts:.....	32
3.3	Definitions of Memory according to ancient texts: .....	33
3.3.1	Memory according to Pātanjali Yoga Sutra:.....	33
3.3.2	Memory according to Bhagāvadgitā: .....	33
3.3.3	Memory according to Ayurveda ( Dhanvantari ): .....	34
3.3.4	Memory according to Vaisesika Drasna:.....	34
3.3.5	Memory according to yoga vashistha: .....	34
3.3.6	Memory according to caraka samhita: .....	35
3.3.7	Memory according to Nyaya darsana ( process of perception – memory ): .....	35
3.3.8	Memory according to Hatha yoga: .....	36
3.4	Defination of Concentration (Dharana) according to ancient texts : .....	37
<b>CHAPTER 4: AIM OF THE STUDY .....</b>		<b>38</b>
4.1.1	: AIM.....	38
4.1.2	: OBJECTIVES.....	38
4.1.3	: RESEARCH QUESTION.....	38
4.1.4	HYPOTHESIS AND NULL HYPOTHESIS.....	38
RESEARCH HYPOTHESIS .....		38
RESEARCH NULL HYPOTHESIS .....		38
<b>CHAPTER 5: METHODOLOGY .....</b>		<b>39</b>
5.1.1	SUBJECTS :.....	39
5.1.2	SOURCE .....	39
5.1.3	INCLUSION CRITERIA.....	39
5.1.4	EXCLUSION CRITERIA.....	39
5.1.5	ETHICAL CONSIDERATION .....	39
5.1.6	STUDY OF DESIGN.....	39
5.1.7	INTERVENTION .....	39
5.2	ASSISSMENT TOOLS.....	40
<b>CHAPTER 6: DATA EXTRACTION AND ANALYSIS.....</b>		<b>41</b>
DEMOGRAPHIC DATA:.....		41
<b>CHAPTER 7: RESULTS .....</b>		<b>42</b>
Table 7.1: VARIABLE 1: WECHSLER MEMORY SCALE (WMS) .....		42

<b>Table 7.2 variable2: SIX LETTER CANCELLATION TEST(ATTEMPTED)</b> .....	42
<b>Table 7.3 Variable3: SIX LETTER CANCELLATION TEST (WRONG)</b> .....	43
<b>Table 7.4 Variable4: SIX LETTER CANCELLATION TEST(NET)</b> .....	43
<b>CHAPTER 9: SUMMARY AND CONCLUSION</b> .....	46
<b>CHAPTER 10: APPRAISAL</b> .....	47
<b>[10.1] Strength of the study:</b> .....	47
<b>[10.2] Limitation of the study:</b> .....	47
<b>[10.3] De-limitation of the study:</b> .....	47
<b>[10.4] Suggestion of the study:</b> .....	47
<b>CHAPTER 11: References:</b> .....	48
<b>CHAPER 12: Appendix</b> .....	52
➤ <b>Integrated yoga module</b> .....	52
➤ <b>Informed concerned</b> .....	53
➤ <b>Six Letter Cancellation Test( SLCT)</b> .....	54
➤ <b>Wechsler Memory Scale(WMS)</b> .....	55
➤ <b>Raw Data :</b> .....	56
<b>Raw Data for Yoga Group:-</b> .....	56
<b>Raw Data for Non-Yoga(control) Group:-</b> .....	57

# CHAPTER 1: INTRODUCTION

## 1.1 Concept of Yoga:

Yoga has been traditionally practiced on daily routine in Indian Culture which is meant for attaining healthy life(Ganpat et al., 2014). Yoga comes from the root 'YUG' which means to join/ union. Thus we can say yoga means joining of Mind and Body(Li & Goldsmith, 2012). Some great scholars also defines yoga as union of Individual self and the Transcendental self (Garfinkel & Schumacher, 2000). Yogic practices help in harnessing inner vital energy and training different organs and system to work efficiently by using the energies in controlled way under conditions of stress(Smith, Hancock, Blake-Mortimer, & Eckert, 2007).

At mental level yoga develops creativity and will power of individual, it removes the weakness and builds energy to overcome situation easily(Drago & Heilman, 2012). It even helps to improve our over all personality. To have balanced personality in individual the essential requirement is strong emotional development which is also done through yogic practices(Deshpande, Nagendra, & Nagarathna, 2009). Emotions are governed by working on our Autonomic Nervous System. Stretching practices, relaxation techniques and meditation and pranayama are very excellent tools which sharpen our Autonomic Nervous System (McCorry, 2007). At intellectual level yoga is good to improve memory and concentration and even helps to reduces psychosomatic disorders like depression and anxiety levels(Brunner, Abramovitch, & Etherton, 2017).

Yoga asanas such as padmasana,vriksasana,natrajasana are good to improve concentration, practicing Suryanamaskara can help to increase memory and concentration. At spiritual level yoga helps to create awareness of self within oneself.

Thus all these personality development at different levels is only done with the help of yogic practices as it works on all the five layers of human existence.

According to Yoga Philosophy we all are made up of 5 layers of existence called as koshas namely

- (1) Annamaya koça (physical level)
- (2) Pranamaya koça (pranic level)
- (3) Manomaya koça (mental level)
- (4) Vijnanmaya koça (intellectual level)
- (5) Ānandamaya koça (bliss layer)

The well being of the individual in all the 5 layers constitutes health according to yoga(Sengupta, 2012).

### **1.2 Concept of Rāja Yoga:**

The Eight limbs of yoga is composed of many layers, all of which can enhance athletic performance(Carroccio et al., 2002). These layers refers to the eight fold disciplines or famously called eight limbs of yoga. (“8Limbs\_of\_Patanjali\_Yoga,” n.d.)They are Yama, Niyama, Āsana, Pranayama, Pratyahara, Dharana, Dhyana and Samadhi. Thus if combined together is called as Raja yoga.(*Research and Sustainable Business*, 2014)

### **1.3 Concept of Āsana:**

Āsana is the first part according to hatha yoga. Āsana is a specific position which opens our energy channels and physical centers. The hatha yoga says that by developing asana the mind also will be controlled. So by doing āsana steadiness also develops(Markil, Geithner, & Penhollow, 2010). Pranā also move freely, if pranā flows is freely moving than body also becomes supply. Stiffness of the body also removed(Riley, 2004). When pranā is increased than body will move itself. If we control the body through daily āsana practice than we can control our mind also. If our mind is controlled than we can concentrate easily(Asana, 2018)

### **1.4 Suryanamaskara:**

Suryanamaskara includes asanas like Pranamasan, hasta utthanasan, padahastasan, ashwasanchalanasan, ashtanaga namasakar, bhujangasan, and parvatasan(Godse, Godse, & Shejwal, 2014). The Rig Veda declares that “Surya is the Soul, both of the moving and

unmoving beings”. The Suryanamaskara also called as Sun salutation, sun adoration for health, efficiency and longevity is a part of Indian traditional yogic practices(Kondam et al., 2015) Suryanamaskara is a part of yoga; it consists of a sequence of postures done with synchronized breathing. The practice of few cycles of SN is known to help in maintaining good health and vigor. The practice of SN does not need any extra gadgets. Also, it is very much aerobic and invigorates the body and the mind(Ganpat et al., 2014). Thus, SN becomes a kind of activity which involves almost every part of the body and is considered as a complete exercise(Kondam et al., 2016). Many of SN practitioners also believe that regular practice of few cycles, when performed properly leads to development and strengthening of almost every part of the body(Javadekar & Manjunath N. K, 2012)

### 1.4.1 Steps of Suryanamaskara according to Bihar School of Yoga with Meaning, Breathing and different chakras:

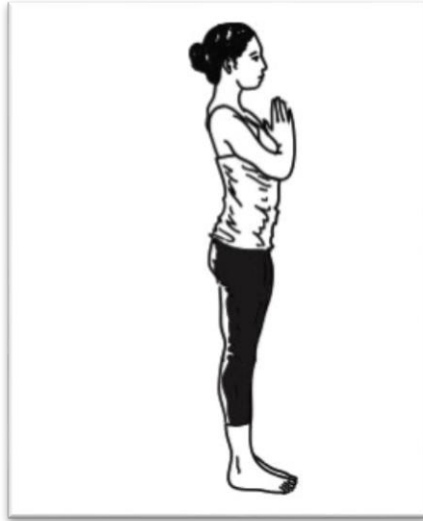
SR	ASANA/ POSTURE	MEANING	BREATHING	CHAKRA RELATED TO
<u>1</u>	Āmāskar mudra	Prayer pose	EXHALE	ANAHATA CHAKRA(heart)
<u>2</u>	Uṣṭāuttānasana	Raised Arms pose	INHALE	VISHUDDHI CHAKRA(throat)
<u>3</u>	Paḍāṣṭāsana	Standing forward bend	EXHALE	MANIPURA CHAKRA(solar plexus)
<u>4</u>	Āḥvaṅāncālanāsana	Equestrian pose	INHALE	ANAHATA CHAKRA(heart)
<u>5</u>	Ōāndāsana	Stick pose	HOLD THE BREATH	SAHASRARA CHAKRA(crown)
<u>6</u>	Āḥṅāngāsana	Salute with eight parts	EXHALE	THE WHOLE BODY
<u>7</u>	Bhujāngāsana	Cobra pose	INHALE	SWADHISTHANA CHAKRA (sacral)
<u>8</u>	Parvatāsana	Downward facing dog pose	EXHALE	SAHASRARA CHAKRA (crown)
<u>9</u>	Āḥvaṅāncālanāsana	Equestrian pose	INHALE	ANAHATA CHAKRA(heart)
<u>10</u>	Paḍāṣṭāsana	Standing forward bend	EXHALE	MANIPURA CHAKRA(solar plexus)
<u>11</u>	Uṣṭāuttānasana	Raised Arms pose	INHALE	VISHUDDHI CHAKRA(throat)
<u>12</u>	Āmāskar mudra	Prayer pose	EXHALE	ANAHATA CHAKRA(heart)

### 1.4.2 Procedure of Asanasa in Suryanamaskara:

(Article, Sharma, & Udainiya, n.d.)

#### STEP 1: Namaskara mudra:

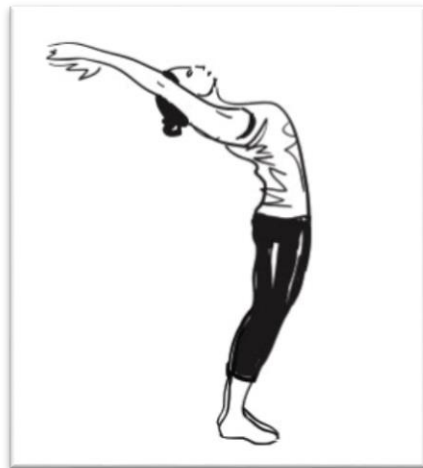
Put both your hands together in front of your chest forming namaskara and eyes closed, both the legs should be placed together with toes joined.



Posture 1: Namaskara mudra

#### STEP 2: hastauttanasana :

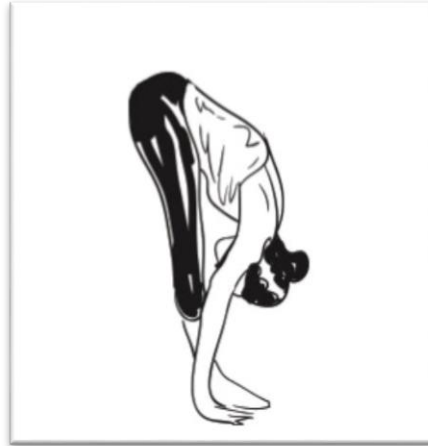
Take a deep breath in and stretch both the hands straight above the head with backward bending of your waist region.



Posture 2: hastauttanasana

STEP 3: Padahastasana:

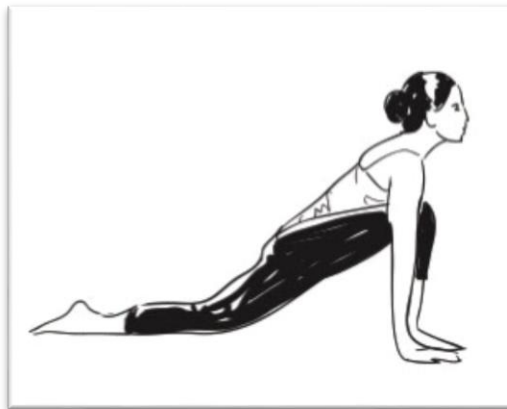
While exhaling extend both hands in front and slowly bend forward keeping the knees straight and touch your palms to ground.



Posture 3: Padahastasana

STEP 4: Āśvaṅcalanasana:

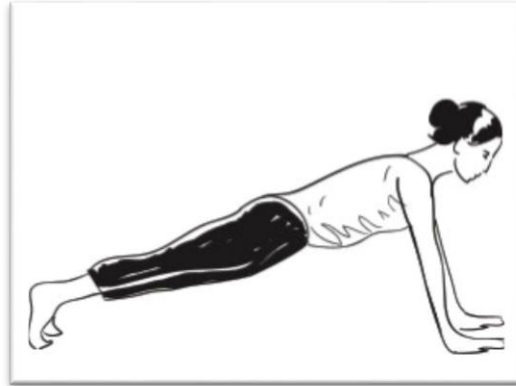
In this step breath in and kick the right leg back. Push your buttocks forward and downwards, so that the left leg is perpendicular to the ground. Look up.



Posture 4: Āśvaṅcalanasana

STEP 5: Dandasana:

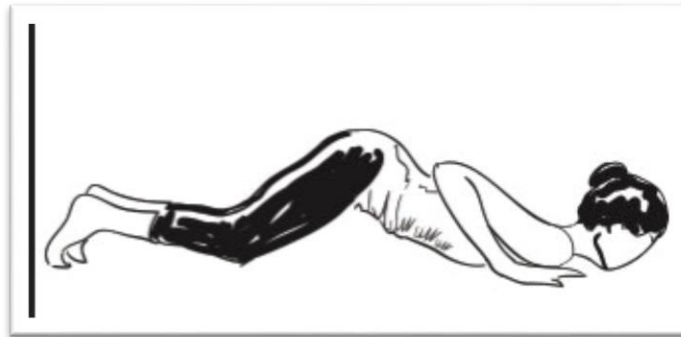
Take the left leg back while exhaling, rest on the palms on toes. Keo the body straight from head to toes inclined to the ground. Take care to keep the neck in the line with your back.



Posture 5: Dandasana

STEP 6: Āstangasana:

While exhaling wiyhout sifting the position of your hands and toes, slide the body forward and rest the forehead, chest , hands , knees and toes on the ground. Raise your buttocks of the ground.



Posture 6: Āstangasana

STEP7: Bhujangasana:

Inhale raise your head and trunk making the spine concave upwards without lifting the position of your hands and feet. Arch your back as far as you can until the elbows became straight. Keepo the knees on the ground.



Posture 7: Bhujangasana

STEP 8: Parvatasana:

While exhaling, raise the buttocks and push the head down until the heels touch the ground without shifting the position of your hands and feet.



Posture 8: Parvatasana

STEP9: Āśvañcalanasana:

Inhale and bring the right leg in between the two hands. Arch the back concave upwards until the right leg is perpendicular to the ground.



Posture 9: Āśvañcalanasana

STEP 10: Padañastasana:

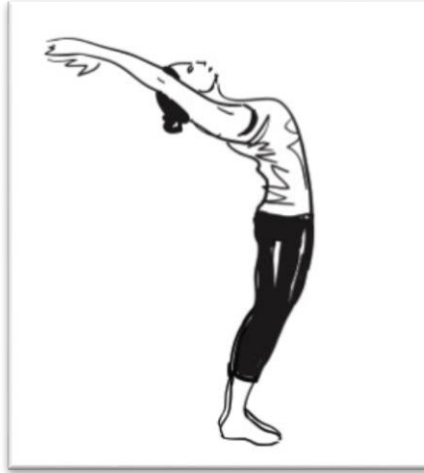
Exhale and bring the left leg forward next to your right leg and reach down with your upper body to touch the forehead to your knees.



Posture 10: Padañastasana

STEP 11: Hastauttanasana:

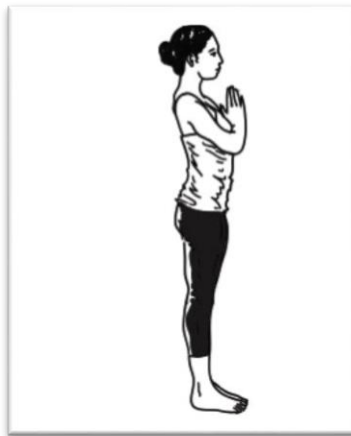
Take the hands above while inhaling and bend the trunk backwards. Give nice back bend to your lower back.



Posture11: Hastauttanasana

STEP12: Namaskar mudra:

While exhaling bring your hands down slowly to namaskara mudra in front of your chest. Slowly release your hands and relax in standing posture. Apart your legs, hands completely relaxed beside your body eyes gently closed. Feel the changes after the practice of suryanamaskara practice.



Posture 12: Namaskar mudra

### 1.4.3 Suryanamaskara mantras with meaning :

- ॐ मित्राय नमः ॥१॥----- Friends of all (मित्राय )
- ॐ स्वये नमः ॥२॥----- Praised by all (स्वये )
- ॐ सूर्याय नमः ॥३॥----- The stimulator (सूर्याय )
- ॐ भानवे नमः ॥४॥----- Giver of beauty (भानवे )
- ॐ खगाय नमः ॥५॥----- Stimulator of senses (खगाय )
- ॐ पुष्णे नमः ॥६॥----- The nourisher (पुष्णे )
- ॐ हिरण्यगर्भाय नमः ॥७॥-----One who posses power to develop vitality and energy (हिरण्यगर्भाय )
- ॐ मारिचाये नमः ॥८॥----- Destroyer of diseases (मारिचाये )
- ॐ आदित्याय नमः ॥९॥----- One who attracts (आदित्याय )
- ॐ सावित्रे नमः ॥१०॥----- Begetter (सावित्रे )
- ॐ अर्काय नमः ॥११॥----- Fit to be revered (अर्काय )
- ॐ भस्कराय नमः ॥१२॥----- Refulgent (भस्कराय )

### 1.4.4 Benefits of Suryanamaskara practices:

Suryanamaskara when is followed regularly and with full dedication brings many benefits at all the different level of existence(Singleton, 2010).

- a) Strengthens the body
- b) Helps relax our mind
- c) Improves flexibility
- d) Helps burn excess fat
- e) Helps built mental focus
- f) Improves blood circulation
- g) Improves functions of internal organs
- h) Improves muscle tone
- i) Improves posture
- j) Helps cope with insomnia
- k) Stimulates nervous system

## **1.5 Physiological effect of Suryanamskara on Body:**

### **I. EFFECT OF MUSCULO-SKELETAL SYSTEM:**

Regular practice of Suryanamaskara needs four times more energy than daily requirement. So by practicing SN helps to burn fats in the body. By its practice person gets good flexibility of leg, back and chest muscles. Even person can improve their hand grip, strength and endurance with daily practice of Suryanamaskara(Sinha, Ray, Sinha, Sciences, & Delhi, 2011).

### **II. EFFECT ON RESPIRATORY SYSTEM:**

By training of Suryanamaskara there is increase in maximum inspiratory pressure & maximum expiratory pressure, so it helps to improve the strength of both the muscles i.e Inspiratory and Expiratory muscles. Even it also improves the strength of Intra costal muscles which will ultimately increase the vital capacity of lungs(Phadke, Joshi, & Yardi, 2014).

### **III. EFFECT ON CARDIOVASCULAR SYSTEM:**

Training of SN improves cardiorespiratory efficiency and fitness(Millington, 1964). It also Increases Systolic Blood Pressure, Peak Expiratory flow, forced vital capacity and Decreases Respiratory Rate, Heart Rate, Diastolic Blood pressure of practitioner (Bhutkar, Bhutkar, & Taware, 2008a).

### **IV. EFFECT ON ENDOCRINE SYSTEM:**

It helps to harmonize endocrine system specially pancreas, thyroid, adrenals and pituitary glands. Suryanamaskara practice is effective for Metabolic Syndrome, Obesity, Diabetes Mellitus, Hyperthyroidism and Menstrual disorders(V. Singh, Sherpa, & Khandelwal, 2015).

### **V. EFFECT ON NERVOUS SYSTEM:**

Practice of SN can be very effective for patients with Lower backache , Different neuronal weaknesses (S. Singh, Malhotra, Singh, Madhu, & Tandon, 2004).

### **VI. EFFECT ON GASTROINTESTINAL SYSTEM:**

Regular practice of Suryanamaskara can improve digestion, removes constipation and is good for different gastrological problem(Evans et al., 2014).

## 1.6 Memory:

Memory is the process in which information is encoded, stored and retrieved. Encoding allows information from the outside to be sensed in the form of chemical and physical stimuli (Hasselmo, 2006). The first stage is encoding process. Stored in the second process. This entails that information is maintained over short time period. The third stage is the retrieval of information that has been stored. Such information should be located and returned to the consciousness. Some attempts may be effortless because of the type of information and other attempts to remember stored information may be more demanding for various reasons (Ericsson & Kintsch, 1995). Memory has been construed as a constructive process, which features from disparate regions of the brain are unified into a coherent whole (Memory, 2007).

### 1.6.1 Following are the different types of memories:

#### **(1)WORKING MEMORY/ SHORT TERM MEMORY:**

The working memory is which is concerned with immediate conscious perceptual and linguistic processing (Koopmann-Holm & O'Connor, 2017). The term working memory is used in different areas of cognitive science. It is used to refer to a limited capacity system allowing the temporary storage and manipulation of information necessary for such complex tasks as learning, comprehension and reasoning (Baddeley, 2000).

#### **(2)LONG TERM MEMORY:**

##### IMPLICIT MEMORY/ PROCEDURAL MEMORY:

Implicit memory's counterpart is known as declarative memory, which refers to the conscious, intentional recollection of factual information, previous experiences and concepts (Schacter, 1987).

##### EXPLICIT MEMORY/ DECLARATIVE MEMORY

###### a) SEMANTIC MEMORY:

Semantic memory is one of the two types of declarative or explicit memory (our memory of facts or events that is explicitly stored and retrieved)

###### b) EPISODIC MEMORY:

Episodic memory refers to specific, contextual details of personal experienced situation that occurred at a particular point in time or at a particular place, from words presented on a list in a laboratory to details of autobiographical events experienced in everyday life (Shayna Rosenbaum, Kim, & Baker, 2017).

###### c) AUTOBIOGRAPHICAL MEMORY:

Autobiographical memory is a memory system consisting of episodes recollected from an individual's life, based on a combination of episodic and semantic memory (Markowitsch & Welzer, 2009).

#### d) VISUAL MEMORY:

Visual memory describes the relationship between perceptual processing and the encoding, storage and retrieval of the resulting neural representations. Visual memory occurs over a broad time range spanning from eye movements to years in order to visually navigate to a previously visited location (Olsson & Poom, 2005).

#### SENSORY MEMORY:

Sensory memory is the shortest-term element of memory. It is the ability to retain impressions of sensory information after the original stimuli have ended. It includes knowledge of the meaning of words, objects, and other percepts experience directly through the senses (Snowden, 2015).

### **1.6.2 Yoga to improve memory:**

Memory plays very important role in humans life and thus to it need to be improved, which is only done with the help of yoga(BKS IYENGAR, 2012). In yoga with the help of asanas, pranayama, trataka, śuryanamaskara which is combination of set of asanas memory of individual can be improved to high level.(Ganpat, Nagendra, & Selvi, 2013)

### **1.7 Concentration :**

The action or power of focusing all one's attention, a close gathering of people or things. It is the ability of the person to think carefully about something which he is performing and nothing else (McClure & McClure, 2006).

Thus in sanskrit concentration means Dharana. Dharana means getting mind on single thought it will result into calmness of mind. Thus will make help to concentrate on single thought and will improve the power of individual to do things properly and with onemindness which is ekagrata(Telles et al., 2012)

#### **1.7.1 Yoga to improve Concentration:**

Yoga helps to brings mind on single thought i.e dharana when we do yoga it brings our awareness on our breath and with practicing for long time it helps mastery over breath which will result to help person understand himself more and will improve awareness about self and will help to get more concentrate more(Taneja, 2014).

## CHAPTER 2: SCIENTIFIC LITERATURE REVIEW

SR. NO	AUTHOR & YEAR	SAMPLE SIZE	INTERVENTION & DURATION	ASSISSMENT	RESULTS	CONCLUSION
1	(A1* & , Sivapriya D V2, 2011)	115 school students (10-14yrs)	45 days daily practice of SN	BP, HR, RR, FVC and PEFR ↓	SBP , PEFR and FVC increased significantly and RR, HR and DBP decreased significantly after the practice of SN	SN practice improves the wellbeing and sports exercise of the understudies.
2	(Bhutkar, Bhutkar, & Taware, 2008b)	78 subjects M=48 F=30	SN practice for 6 months	Bicycle ergometry and various lung functions tests, in both subjects	It was seen that after training there was diminishes RPS and BP.in the mean time it builds CER and RC.	SN practice can be advocated to improve CRE for patients as well as healthy individuals.
3	(A. Bhavanani, Madanmohan, Udupa, & Ravindra, 2011)	42 school children 12-16 yrs were randomly divided into two groups of 21 each.	Group I and Group II received 6 months training in performance of SSN and FSN respectively.	Isometric hand grip strength measured with dominant hand gripping the inflated cuff of a mercury manometer Maximum inspiratory	Preparing in SSN created a huge reduction in Diastolic weight, interestingly, preparing in FSN delivered a critical increment in SBP . In spite of the fact that	SN has positive advantages as it improve of PF, RP, hand grasp quality and continuance and resting cardiovascular parameters. It additionally

				pressure and maximum expiratory pressure Forced vital capacity ,forced expiratory volume measured using a computerized spirometer	there was a very huge increment in IHG quality and HGE in both the readings, the expansion in HGE in FSN readings was altogether more than in SSN readings.	shows the difference between the impacts of FSN are like physical high impact works out though effect of SSN are like those of yoga training.
4	(Javadekar & Manjunath N. K, 2012)	64 healthy volunteers age group 12 to 14 years randomly allocated to 2 groups with 32 students each (Experimental group and Control group)	30 days of intervention (Suryanamaskara or Physical Exercise) using a Digit Letter Substitution Task	Sustained Attention	The data were normally distributed and the baseline data across the groups The pre-post data within each group was analyzed using a paired 't' test. There was a significant increase in number of letters substituted per digits in both yoga as well as control groups	Physical activity given regularly in a structured manner followed by supine rest improves the process of attention.
5	Ganpat, TikheSham Kumar, Sanjay Ramarao, NagendraHongasandra Devi, Thounaojam Memtonbi	Sixty orphan boys Y=30 C=30	1 month Suryanamaskara practice	Body Mass Endurance BMI Body Weight	The Shapiro-Wilk Test and Paired Samples Test using Statistical Package for the Social Sciences	SN training may enhance SA among OB, thus, may prove useful for their AP.

	2015				16 showed that there was 50.75% increase	
6	(Ganpat et al., 2014)	96 subjects	Suryanamskara for 1 month	sustained attention	When compare with predata analysis, the SLCT showed 30.61% increase in WA and 35.44% increase	predata analysis, the SLCT showed 30.61% increase in WA and 35.44% increase the post analysis of SLCT and DLST scores showed that the SN was associated with increase in TA and NS and decrease in WA scores. Thus, the SN holds great promise in enhancing sustained attention in healthy individuals.
7	(A. B. Bhavanani, Ramanathan, Balaji, & Pushpa, 2013)	Both the groups have female participants 21= YG 19=CG	HR, (ART) and (VRT) were recorded before and after three rounds of SN in study group as well as 5 minutes of quiet	The Six Letter Cancellation Test and Digit Letter Substitution Test	SN produced immediate decrease in both VRT and ART. This was pronounced when delta% was compared	Faster reactivity may be due to intermediate level of arousal by conscious synchronization of dynamic movements with

			sitting in both groups.		between groups. HR increased significantly following SN compared with both self-control and external-control group	breathing. Rise in HR is attributed to sympathetic arousal and muscular exertion
8	(Phadke et al., 2014)	30 healthy young individuals in the age group of 18-35 years The numbers of Suryanamaskars were gradually increased from 4 in the first session to 24 in the last session.	3 WEEKS TRAINING OF SN	HR, auditory reaction time (ART) and visual reaction time (VRT)	Results Significant increase in muscle power aerobic capacity seen. Also improvement noted in the DASS score post 3 weeks.	Conclusion is Suryanamaskar can be considered as an integral part of muscle strengthening as well as aerobic conditioning programme.
9	(Kerketta Inder, Singh Kunvar, & Bisht Sunita, 2015)	Twenty male students of 10 +2 standard	six weeks of Suryanamaskar training	flexibility and agility Vertical jump test, Queen's college step test and DASS [Depression, Anxiety and Stress Scale]	The result of the study showed that there was significant difference between pre and post test of flexibility and agility.	On the basis of the findings it was concluded that the Suryanamaskar training may be responsible for the improvement of flexibility and agility
10	Stec, Krzysztof Pilis, Karol Pilis, Wiesław Michalski, Cezary	three healthy middle-aged men	of 60 minutes DSN practice	heart rate (HR), minute pulmonary	For subject CM this value was exceeded in the	High physical fitness determined by

	2016		Dynamic Suryanamaskar	ventilation (VE), minute oxygen consumption (VO <sub>2</sub> ), minute carbon dioxide excretion (VCO <sub>2</sub> ) and RER	middle of the trial. For subject MM, this value had already been exceeded in the first 2 minutes. In addition, during the trial subject KS achieved almost his maximum values for HR and VO <sub>2</sub> .	decades long yogic training and perfect mastery of the DSN techniques made it possible for subject KS to complete the trial by means of aerobic energy resynthesis only, despite a very high cardiovascular workload and high oxygen uptake.
11	Phatak, Eeshan Gaopande, Sumant Patil, Abhishek Deshpande, Yudhishtir Ghorpade-Aher, Jayshree Deopujari, Kalyani Joshi, Aniruddha 2018	36 in-dividuals (27 male, 9 female) of age group 18-23 years for 7 days.	Suryanamaskara for 7 days	Nadi Tarangini device through three pressure sensors at vata, pitta and kapha	There was substantial difference between the pulse patterns for different prakritis. In particular the (V) has shifted after performing Suryanamaskar	The results found demonstrate and support the immediate and long term effects of Suryanamaskar on the individuals.
12	Karpagam, S Gaur, Girwar Singh Trakroo, Madanmohan Kumar, S Senthil	Thirty healthy school children were randomly divided into two	immediate effect of slow and fast suryanamaskar on	heart rate and blood pressure, SLCT	FS produced a significant increase in SBP and RPP. On the other hand, SS	It is recommended that slow SN may be used as a lifestyle

	2013	groups of 15 each			produced a significant decrease in DBP but there was no significant change in SBP or RPP.	component for school children and also for subjects with pre and stage I hypertension and mild degree cardiac patients undergoing rehabilitation
13	Shyam Karthik, P. Chandrasekhar, M. Ambareesha, Kondam Nikhil, C. 2014	50 students	2 months of pranayama and SN practice	VC, TV, ERV BHT PEFr	VC has increased from TV has increased from ERV also shows increase in values from BHT also shows increase in values.	There is a statistically significant increase in pulmonary functions following yoga training. Yoga practice can improve pulmonary functions in healthy individuals and hence to prevent respiratory diseases in future.

## **ABBREVIATION**

SN= Suryanamaskara

FS= Fast Suryanamaskara

SS= Slow Suryanamaskara

BHT= Breath holding time

TV= Tidal volume

BP= Blood Pressure

SBP= Systolic blood pressure

DBP= diastolic blood pressure

RPR= Resting Pulse Rate

RPP= Rate Pressure Product

HR= Heart Rate

CRE= Cardio Respiratory Efficiency

RC= Respiratory Capacity

FVC = forced vital capacity

VC= Vital capacity

PEFR= peak expiratory flow rate

ERV= Expiratory Reserve volume

PF= pulmonary function

IHG= isometric hand grip

HGE=hand grip endurance

VRT=visual reaction time

ART=auditory reaction time

RER=respiratory exchange ratio

(V)=Valley point

## CHAPTER 3: REVIEW OF ANCIENT LITERATURE

### 3.1 Definitions of yoga according to ancient texts:

#### 3.1.1 Yoga according to Pātanjali:

योगः चित्त वृत्ति निरोधः ॥१-२ ॥

*Yogaḥ citta vṛtti nirodhaḥ ॥1-2॥*

Meaning: this is the cessation of modification of mind.

#### 3.1.2 Yoga according to yoga vasiṣṭa:

मनः प्रशमन उपयः योग इत्यभिधीयते ॥३-९-३२ ॥

*Manaḥ praśamana upayaḥ yoga ityabhidhiyate ॥3-9-32॥*

Meaning: yoga is apt approach to quiet down the brain.

#### 3.1.3 Yoga according to Bhagavad Gita:

बुद्धियुक्तो जहतीज उभे सुकृतदुष्कृते

तस्माद्योगय युज्यस्व योगः कर्मसु कौशलम् ॥२-५० ॥

*Buddhiyukto jahatīja ubhe sukṛitaduṣkṛite*

*tasmādyogaya yujyasva yogaḥ karmasu kauśalam ॥2-50॥*

Meaning: one who wisely practice the study of work without connection can dispose of both great and terrible response in this life itself. In this way, take a stab at Yoga, which is the craft of working skillfully(in legitimate conciousness).

### 3.2 Sun according to various scriptures:

#### 3.2.1 According to RGVEDA:

अयं देवान मपसाम् अपस्तमो यो जजान रोदसि विश्वशंभुवा वि यो ममे

रजसि सुक्रतुययाऽजरेभिः स्कम्भनेभिः समान्दचे ॥

*Ayaḥ devāna mapasām apastamo yo jajāna roodasi viṣvaṣambhuvā vi yo mame rajasi*

*Sukratuyayā'jarebhiḥ skambhanebhiḥ samānice ॥*

Meaning: “ He the most active gods, who produced the Heaven and Earth which are beneficial to all; who from a desire to benefit (Men) measured (constructed) the words, with their undelaying supports, he has been lauded (by us).”

### 3.2.2 According to ISVASYOPANISHAD :

हिरण्मयेन पात्रेण सत्यस्यापिहितं मुखम् ॥

तत्त्वं पूषन्नपावृणु सत्यधर्माय दृष्टये ॥

*HiraNmayeaena paatreNa satyasyaapihitaM mukham..  
TatvaM puuShannapaavaNu satyadharmaya ddaSTaye ..*

Meaning: Like a lid to a vessel, oh Sun, your golden rays are like entrance to the Truth. Kindly open this entrance which will lead us to the truth.

### 3.2.2 Other Texts:

#### RAMAYANA:

The old India the incredible symbol Ram turned into the lord of the sun based race in the epic Ramayana. The foundation of the present Hindu culture lie in the old Vedic sacred writings, which contain various sloshes alluding to sun god.

*Hearing this advice, Shri Rama who was endowed extraordinary energy and had a sundued mind found his grief immediately dissipated. He retained the alleluia in his memory with the help of sun God. (Aditya Hridayam:28)*

### 3.3 Definitions of Memory according to ancient texts:

#### 3.3.1 Memory according to Pātanjali Yoga Sutra:

अनुभुत विशया असम्प्रमोश स्मृति ॥

| *Anubhuta viśayā asampramośa smṛtiḥ* |

Meaning: The procedure by which considerations which have been experienced are recovered is called memory. Recollections are framed through related knowledge ( Anubhuta visaya ). The way toward putting away happens through discernment and experience. All the over four types of psyche brings their very own memory. They structure engraves in the different layers of mind some shallow, some profound established. A portion of these engravings are prepared to be releaved (Asampromosah) effectively.

#### 3.3.2 Memory according to Bhagāvadgītā:

सर्वस्य चाहं हृदि सन्निविष्टो मत्तः स्मृतिज्ञानमपोहनंच

वेदैश्च सर्वैरहमेव वेद्यो वेदान्तकृद्वेदविदेव चहम् ॥ १५-१५ ॥

*Sarvasya cāhaḥ hṛdi sanniviṣṭo mattaḥ smṛtijiñānamapohanañca  
Vedaiñca savairahameva vedyo vedāntakṛdvedavideva caham*|| 15-15||

Meaning : I am seated in the heart of all, I am thye source of the memory, knowledge and reasoning faculty. It is varily “I” known by all the vedas, I am indeed the author of the vedantas and the correct interpreter and the knower of the vedas too. The heart , is an important of the body. All the feelings purify all objects an actions etc. mode of goodness “ maha smriti..... cha..... smriti “ meansthe recollection of an object or incident etc. which was precivied in the past by the person but which he forget. Thus recollectiion can be of two kind natural and by effect.

### 3.3.3 Memory according to Ayurveda ( Dhanvantari ):

तत्वज्ञाने स्मृतिर् यस्य रजोमोहव्रतात् मनः  
ब्रस्यते सा स्मिन्नभ्रमश स्मार्तव्यम् हि स्मृतौ स्थितम् च ॥ २॥२  
*Tatvajñāne smritir yasya rajomohavratāt manaù  
brasyate sā smitrabhramśa smārtavyam hi smātau sthitam ca || 2/2*

Meaning : If memory is impact due to a person being overcome by rajas and tamas . this is known as impairment of memory.

### 3.3.4 Memory according to Vaisesika Drasna:

अत्ममनसोः संयग विशेषात् षोशत् सस्कारवाच स्मृतिः ।  
*Atmamanasoù saàyaga viṣeṣāt ṣoṣat samskāravāca smātiù|*

Meaning : The samskara which arises because of special conjunction between atma(soul) and the manas(mind) is termed as smriti.

### 3.3.5 Memory according to yoga vashistha:

वासनैव महाराज स्वरुप विद्धि चेतसः ॥  
*Vāsanaiva mahāraja svarupa viddhi cetasaù ||*

Meaning : Lord ! knows the psychological impressions or learning got from memory showing as wants and musings establishes the acquire idea of chitta or mind stuffs. Knowing or discernment is the reason for this imperfection or mistake as I in my heart. The correct recognition or learning is conceived immediately when the mind winds up pure because of relationship with sacred texts and customs individual and steady practice.

दृष्टश्रुतानुमूतानाम् स्मरण् स्मृतिरुच्यते ।  
*Dāṣṭśrutānumūtanām smarāṅ smātirucyate|*  
(caraka Vimana sthana.) ( ch. Y.V )

Meaning : Remembering the things which we have seen, heard, experienced is known as Smrti.

आत्ममनसोः संयोग विशोषात् षोशात् सस्कारवाच स्मृतिः ।

*Ātmamanasò saàyoga viçòñät ñoçät samskäraväca smätiiù/*

( Vaisesika Darasana )

Meaning: The memory is that knowledge which will establish itself with special contact between soul and mind.

### 3.3.6 Memory according to caraka samhita:

धीविभ्रमः सत्त्वपरिप्लवश्च पर्याकुला दृष्टीधीरता च

अबध्दवात्तवं हतृदयं च शुन्यसमन्यमुन्मादगदस्य लिङगम् ॥६॥

समुढचेता न सुखं न दुखं नचारधर्मौ कृत एव शान्तिम् ।

विन्दत्यपास्तस्मृतिबुद्धिसंज्ञो भ्रमत्ययं चेत इतस्ततश्च ॥७॥

*Dhévíbhramaù sattvapariplavaçca paryäkulä dâñöédhératä ca  
Abadhavättavaà hatèdayaà ca çunyasamanyamunmädagadasya liòagam||6||  
Samuòhacetä na sukhaà na dukhaà nacäradharmau kåta eva çäntim/  
Vindatyapästasmâtibuddhisäñjio bhramatyayaà ceta iatastataçca||7||*

Meaning : Intellectual confusion, fickleness of mind, unsteadiness of vision, impatience, inchoerent speech and sentation of vacuum in the heart ( vacantness of mind ). This are the general signs and symptoms of unmaada(insanity). Such a patient, with bewildered mind becomes incapable of experiencing pleasure and sorrow. He becomes incapable of conducting the mind all together and becomes devoid of memory, intellect and recognition. His mind wavers here and there.

### 3.3.7 Memory according to Nyaya darsana ( process of perception – memory ):

इन्द्रियार्थासन्निकर्षोत्पन्नम् ज्ञानमव्याभिचारिण

व्यवसायात्मकम् प्रत्यक्ष्यम् न्यायसुत्रम् । २।३।२।२

*Indriyarthäsannikarñotpannam jñanamavyäbhicärin  
vyavasäyätmakam pratyakñyam nyäyasutram/ 2/3/2/2*

Meaning : Perception is that knowledge which arises from the contact of sense with its object and which is determinate unnamable, and non-erratic.

### 3.3.8 Memory according to Hatha yoga:

चित्तं न सुप्तं नोजाग्रत्स्मृतिविस्मृतिवर्जितम् ।

न चास्तमेति नोदेति यस्यासौ मुक्त एव साः ॥४॥११०॥

*Cittaà na suptaà nojägratsmãtivismãtivarjitam /  
Na cãstameti nodeti yasyãsau mutka eva säù||4|110||*

Meaning : One whos mind is either asleep nor awake(whos mind) is devoid of memory and forgetfulness neither oblivious nor active, is indeed liberated.

### 3.4 Defination of Concentration (Dharana) according to ancient texts :

देशबन्धश्चित्तस्य धारणा ॥ प यु सु भि पा ॥१ ॥

deśabandhaścittasya dhāraṇa ॥ pa yu su bhi pā ॥1॥

Fixing on a single point is “deçabandha”;

Of your mind is “cittasya”;

Concentration is “dhāraṇa”.

Thus this slokha means fixing your mind on a single object or point is known as concentration or dhāraṇa.

Internally, it can be fixed on any Cakra or any body part. After having control over Prana through pranayama, and all other sense organs including mind, through the practice of Prathahara one should fix the mind on some kind of prop for doing concentration or dhāraṇa.

When we practice dhāraṇa there will be only one Vrtti.e concentration is on single object. All the mental activaities will automatically stop. The Yogi cah have a very good dhāraṇa when he is capable of controlling is sense organs and breath which will result in bringing mind on single object . for such a person mind becomes calm. Dhāraṇa can be practiced only by those persons whose mind are free from distractions  
(Ch.2-49,50; Ch.1-14)

धारणासु च योग्यता मनसः ॥

dhāraṇāsu ca योग्यता manasaḥ ॥

In Yoga Sutra (2.53), Mahirshi Patanjali says:

Pranamyama makes the mind steady and is the greatest tapas. Mind gets one-pointedness, Ekagrata. And the mind becomes fit for practising Dharana.

Pranayama helps in mediatation by removing the hudles in the path. Thus pranayama helps in Dharana( concentration) to great extent.

## **CHAPTER 4: AIM OF THE STUDY**

### **4.1.1 : AIM**

This study the Suryanamaskara based intervention and its effect on the memory and concentration on High School students.

### **4.1.2 : OBJECTIVES**

1. To give Suryanamaskara practice which have significant effect on the memory of High School students.
2. To improve the concentration of school students through Suryanamaskara.

### **4.1.3 : RESEARCH QUESTION**

What is the effect of Suryanamaskara based intervention on memory and concentration of High School Students?

### **4.1.4 HYPOTHESIS AND NULL HYPOTHESIS**

#### **RESEARCH HYPOTHESIS**

Practice of Suryanamaskara will improve memory and concentration on high school students. It will help to memorize faster and easier.

#### **RESEARCH NULL HYPOTHESIS**

Practice of Suryanamaskara may not improve memory and concentration on high school students. It will not help to memorize faster and easier.

## **CHAPTER 5: METHODOLOGY**

### **5.1.1 SUBJECTS :**

SAMPLE SIZE=80 (40 in each group).

The sample size depends upon Verbal Memory (which is obtained through sample size calculation using previous studies for the values  $-4.2 \pm 1.5$  &  $5.0 \pm 2.0$ )

### **5.1.2 SOURCE**

Participants were recruited from D.J.Doshi Gurukul College Of Commerce, Mumbai, Maharashtra

### **5.1.3 INCLUSION CRITERIA**

- I. Both the genders participants are taken for the research.
- II. Healthy students.
- III. Age group between 14 to 16, both the genders
- IV. Willing to sign the informed consent.

### **5.1.4 EXCLUSION CRITERIA**

- I. Candidates suffering from any diseases.
- II. Girls participants having at the time of menstrual flow

### **5.1.5 ETHICAL CONSIDERATION**

The informed consent from the college head was obtained on the behalf of the students, as their acting guardian. The study was approved by the Institution Review Board of SVYASA University.

### **5.1.6 STUDY OF DESIGN**

- This is an experimental study to see the effect of Suryanamaskara on students memory and concentration. This is BETWEEN GROUP PRE-POST DESIGN.
- In this style of design there are two groups, one is EXPERIMENTAL GROUP which under goes Intervention of Suryanamaskara practice whereas the other group is CONTROL GROUP which will have same environment, situation, routine, time but except the intervention program.

### **5.1.7 INTERVENTION**

- Students were given 15 days yoga based intervention which includes loosing practices, set of Suryanamaskara followed by DRT for 45 minutes.
- Both the genders were assessed on SLCT, WMS before and after the intervention.

## **5.2 ASSESSMENT TOOLS**

### **5.2.1 SIX LETTER CANCELLATION TEST (SLCT)**

A Six Letter Cancellation test was administered to assess functions such as selective and focused attention, visual scanning and activation and inhibition of rapid response. SLCT has been used in similar type of design on Indian population and around the world too. The six-letter cancellation task was presented on a worksheet which specified the six target letters to be cancelled and had a 'working section' of letters of the alphabet arranged randomly in 22 rows and 14 columns. Participants were asked to cancel as many of the six target letters as possible in 130 min. They were told that there were two possible strategies, i.e., (i) marking all six letters at a time or (ii) selecting any one target letter of the six, and they were to choose whichever strategy suited them. They were also told that they could follow a horizontal, vertical, or a random path according to their choice(Pradhan & Nagendra, 2010).

### **5.2.2 WECHSLER MEMORY SCALE (WMS)**

The 10 words were simple and easy to reproduce. The scoring for correctly reproduce words is given one mark. All the marks are counted and total. The scale for assessment was WMS for children. WMS was standardized in 1945(Golden, 2004)

## CHAPTER 6: DATA EXTRACTION AND ANALYSIS

### DEMOGRAPHIC DATA:

The total 80 subjects were recruited for the study, in which 18 male and 22 female subjects were there in both the respected groups from the age group of 14 to 16 years.

**Table 6.1: demographic table**

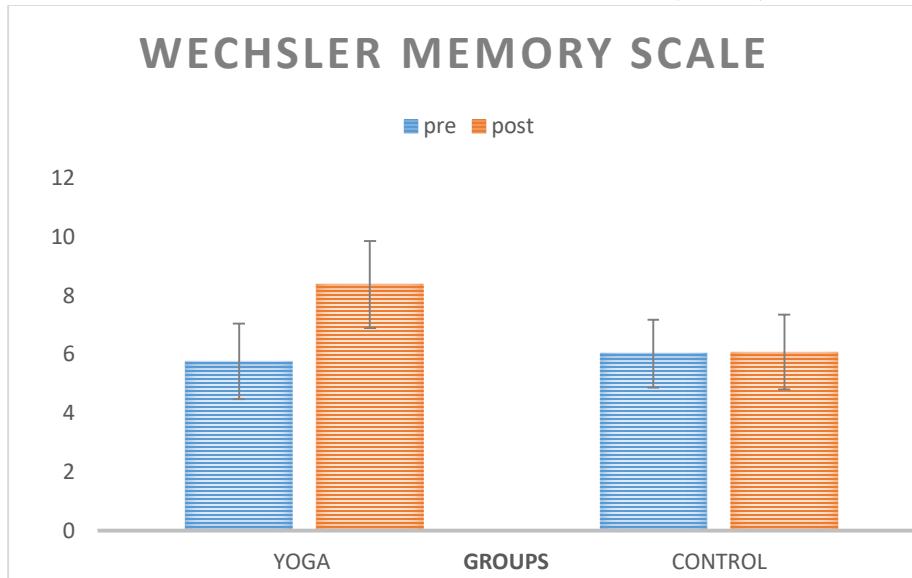
GROUPS	GENDER	SUBJECTS	MEAN SD(AGE)
YOGA GROUP	M	18	15.277778±0.95828
YOGA GROUP	F	22	15.55556±0.855585
CONTROL GROUP	M	18	15.27273±0.7025
CONTROL GROUP	F	22	15.36364±0.789542

**Table 6.2: Comparison of pre score and post score in both the groups  
(Within Group & Between Group)**

SR. NO.	VARIABLES	EXPIREMENTAL GROUP (M= 18, F=22 )				CONTROL GROUP (M= 18, F=22 )				BETWEEN GROUP P-VALUE
		PRE	POST	% CHANGE	P-VALUE	PRE	POST	% CHANGE	P-VALUE	
1	WMS	5.75 ± 1.29	8.37± 1.15	45.56	1.256e- 13	6.02± 1.48	6.07± 1.28	0.83	0.5993	6.063e-10
2	SLCT_ATTEMPTED	28.85± 10.84	43.17± 9.91	49.63	2.507e- 06	26.05± 4.87	33.25± 5.20	27.63	1.307e- 10	5.745e-07
3	SLCT_WRONG	1.47± 5.11	1.22± 3.91	17.01	0.8139	3.12± 2.58	3.2± 2.39	2.56	0.862	1.571e-06
4	SLCT_NET	27.37± 9.03	41.95± 8.69	53.27	3.719e- 07	22.95± 5.70	30.05± 4.95	30.93	3.209e- 09	2.72e-10

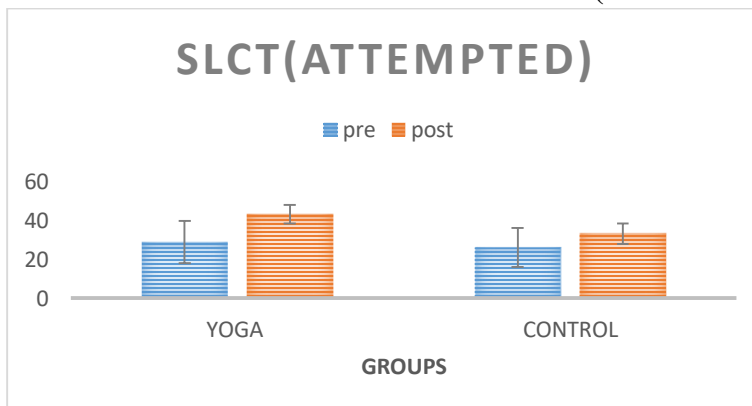
## CHAPTER 7: RESULTS

**Table 7.1: VARIABLE 1: WECHSLER MEMORY SCALE (WMS)**



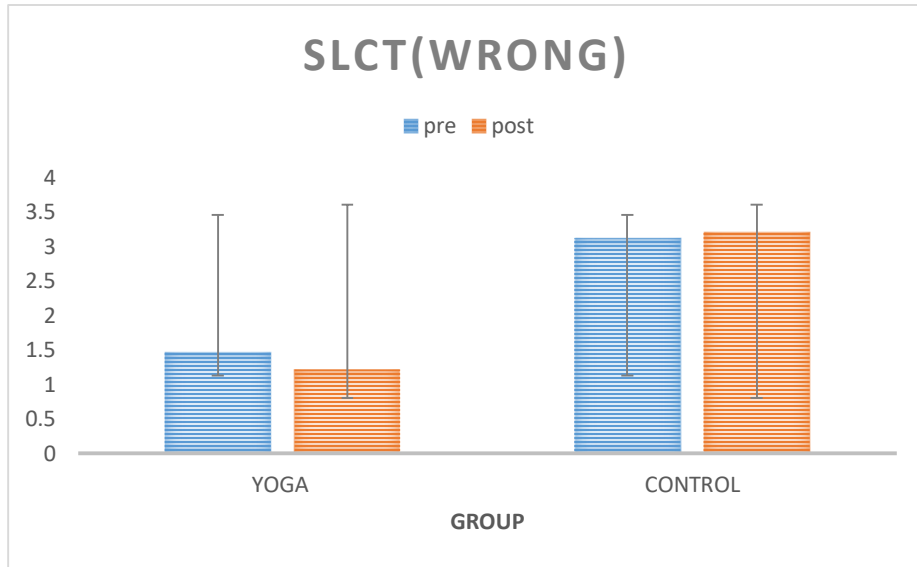
	YOGA	CONTROL
pre	5.75	6.02
post	8.37	6.07

**Table 7.2 variable2: SIX LETTER CANCELLATION TEST(ATTEMPTED)**



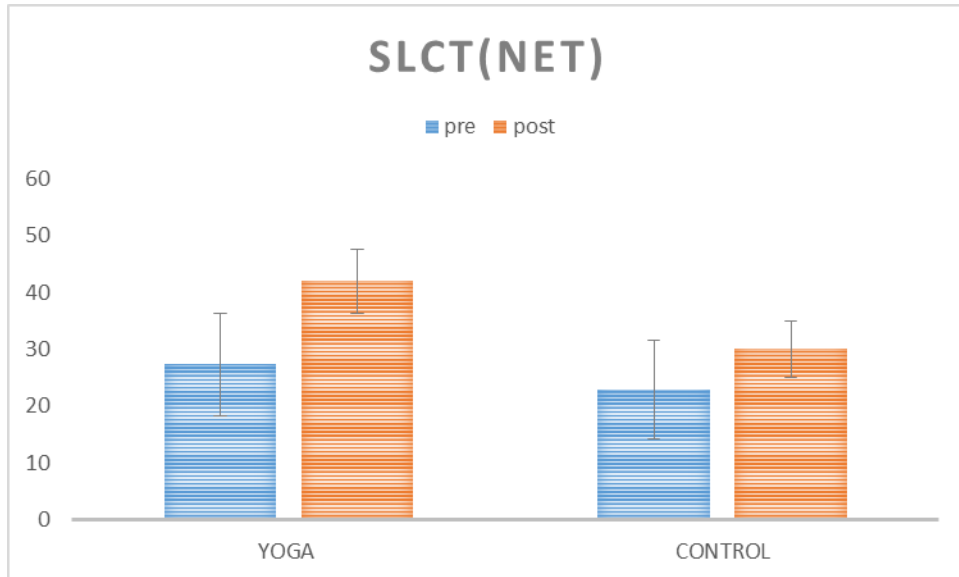
	YOGA	CONTROL
pre	28.85	26.05
post	43.17	33.25

**Table 7.3 Variable3: SIX LETTER CANCELLATION TEST (WRONG)**



	YOGA	CONTROL
pre	1.47	3.12
post	1.22	3.2

**Table 7.4 Variable4: SIX LETTER CANCELLATION TEST(NET)**



	YOGA	CONTROL
pre	27.37	22.95
post	41.95	30.05

## CHAPTER 8: DISCUSSION

This present study evaluated the changes after the practice of Suryanamaskara and normal routine activity in high school students with the assessment of two tools to check the memory and concentration. (1) WECHSLER MEMORY SCALE(WMS) (2) SIX LETTER CANCELLATION TEST(SLCT) at the beginning and at the end of 15 days. For this study the design was two group pre-post comparison. Shapiro test was used to check the normality in both the groups after which Wilcoxon rank sum test. There was significant improvement in pre and post of both the groups, but the percentage change was high in yoga group as compared with non yoga group/ control group:  $p < 0.001$  for both the groups (Wilcoxon Test) in memory assessed by Wechsler memory scale after 15 days of Suryanamaskara practice.

**Experimental group** also showed significant improvement in

WMS(45.56% ↑) with ( $p = 1.256e-13$ )

SLCT\_ATTEMPTED (49.63% ↑) with ( $p=2.507e-06$ )

SLCT\_WRONG(17.01% ↓) with ( $p=0.8139$ )

SLCT\_NET(53.27% ↑) with ( $p= 3.719e-07$ )

**Yoga group** also showed significant improvement in

WMS(0.83)with ( $p =0.5993$ )

SLCT\_ATTEMPTED (27.63) with ( $p=1.307e-10$ )

SLCT\_WRONG(2.56) with ( $p=1.571e-06$ )

SLCT\_NET(30.93) with ( $p=3.209e-09$ )

There was significant difference in **between group** of yoga based intervention and non yoga group according to the p-value:

WMS ( $p= 6.036e-10$ )

SLCT\_ATTEMPTED ( $p=5.745e-07$ )

SLCT\_WRONG ( $p=1.571e-06$ )

SLCT\_NET ( $p=2.72e-10$ )

The objective of this research is to study the effect of practicing Suryanamaskara on memory and concentration, to analysis significant difference between the memory score of the group before yoga practice and after, to analyses significant difference between the academic performance of this yoga group before yoga practice and to study the differences in memory score of the non yoga group(control group) with yoga group. An earlier study by (A. Bhavanani et al., 2011) (Joshua & C Dunbar, 2016)which examine the improvement in functions after the practice of Suryanamaskara also support the results of the current study significant changes in the subjective of cognitive functions.

The data of the subjects in the two groups( 40 high school students in each group) were analyze to find out the effect of SN on their memory and concentration.

## **CHAPTER 9: SUMMARY AND CONCLUSION**

This experimental study suggests that daily yoga practice (Suryanamaskara) for a short duration helps to improve concentration, and memory of high school students. It was observed that both the group had significant improvement in memory and concentration but there was high improvement in yoga group when they were given yoga based intervention that is Suryanamaskara practice. Where as in non yoga group there was improvement but was not as more as yoga group.

Thus we can conclude that there was significant improvement in yoga group when compared to that measurement taken on first day and after the 15 days of yoga based intervention of Suryanamaskara, where as in non yoga group the students were under same situation and routine as given to yoga group but their improvement was less as they were not under the practice of yoga based intervention.

## **CHAPTER 10: APPRAISAL**

### **[10.1] Strength of the study:**

- This is only on study which is done seeing the EFFECT OF SURYANAMASKARA on concentration and memory of high school students.
- All the students were regular in the class and support.

### **[10.2] Limitation of the study:**

- Short duration of the intervention.

### **[10.3] De-limitation of the study:**

- Only one high school students of (12<sup>th</sup> standard ) were taken in my study.
- Age group were 14years to 16years(both the gender)
- Sample area for my research study is Mumbai, Maharashtra.

### **[10.4] Suggestion of the study:**

- A bigger sample can be taken for future study.
- Intervention could be given for long period.

## CHAPTER 11: References:

1. 8Limbs\_of\_Patanjali\_Yoga. (n.d.).
2. A1\*, S. K., & , Sivapriya D V2, S. T. (2011). EFFECTS OF SURYANAMASKAR ON CARDIO VASCULAR AND RESPIRATORY PARAMETERS IN SCHOOL STUDENTS. *Recent Research in Science and Technology* 2011, 3(10): 19-24.
3. Article, R., Sharma, N., & Udainiya, N. (n.d.). MECHANISM OF CHAKRAS IN SURYANAMASKAR AND ITS BENEFITS : A.
4. Asana. (2018). ASANA.
5. Baddeley, A. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences*. [https://doi.org/10.1016/S1364-6613\(00\)01538-2](https://doi.org/10.1016/S1364-6613(00)01538-2)
6. Bhavanani, A. B., Ramanathan, M., Balaji, R., & Pushpa, D. (2013). Immediate effects of suryanamaskar on reaction time and heart rate in female volunteers. *Indian Journal of Physiology and Pharmacology*.
7. Bhavanani, A., Madanmohan, Udupa, K., & Ravindra, P. (2011). A comparative study of slow and fast suryanamaskar on physiological function. *International Journal of Yoga*, 4(2), 71. <https://doi.org/10.4103/0973-6131.85489>
8. Bhutkar, P. M., Bhutkar, M. V., & Taware, G. B. (2008a). Effect of Suryanamaskar Practice on Cardio-respiratory Fitness Parameters : A Pilot Study . *Al Ameen Journal of Medical Sciences*.
9. Bhutkar, P. M., Bhutkar, M. V., & Taware, G. B. (2008b). Effect of Suryanamaskar Practice on Cardio-respiratory Fitness Parameters : A Pilot Study . *Al Ameen Journal of Medical Sciences*, 1(2), 126–129.
10. BKS IYENGAR. (2012). *LIGHT ON YOGA. Uma ética para quantos?* <https://doi.org/10.1007/s13398-014-0173-7.2>
11. Brunner, D., Abramovitch, A., & Etherton, J. (2017). A yoga program for cognitive enhancement. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0182366>
12. Carroccio, A., Faries, P. L., Morrissey, N. J., Teodorescu, V., Burks, J. A., Gravereaux, E. C., ... Marin, M. L. (2002). Predicting iliac limb occlusions after bifurcated aortic stent grafting: Anatomic and device-related causes. *Journal of Vascular Surgery*. <https://doi.org/10.1067/mva.2002.128309>
13. Deshpande, S., Nagendra, H. R., & Nagarathna, R. (2009). A randomized control trial of the effect of yoga on Gunas (personality) and Self esteem in normal healthy volunteers. *International Journal of Yoga*. <https://doi.org/10.4103/0973-6131.43287>
14. Drago, V., & Heilman, K. M. (2012). Creativity. In *Encyclopedia of Human Behavior: Second Edition*. <https://doi.org/10.1016/B978-0-12-375000-6.00112-9>
15. Ericsson, K., & Kintsch, W. (1995). Ericsson & Kintch - 1995 - Psyc Review.pdf. *Psychological Review*.
16. Evans, S., Lung, K. C., Seidman, L. C., Sternlieb, B., Zeltzer, L. K., & Tsao, J. C. I. (2014). Iyengar yoga for adolescents and young adults with irritable bowel syndrome. *Journal of Pediatric Gastroenterology and Nutrition*. <https://doi.org/10.1097/MPG.0000000000000366>
17. Ganpat, T., Nagendra, H., & Selvi, V. (2013). Efficacy of yoga for mental performance in university students. *Indian Journal of Psychiatry*. <https://doi.org/10.4103/0019-5545.120550>
18. Ganpat, T., Pailoor, S., Prithvi, A., Ramarao, N., Arun, K., & Deshpande, S. (2014). Suryanamaskara exercise enhances sustained attention. *Saudi Journal of Sports Medicine*. <https://doi.org/10.4103/1319-6308.131610>
19. Garfinkel, M., & Schumacher, H. R. (2000). Yoga. *Rheumatic Disease Clinics of North America*. [https://doi.org/10.1016/S0889-857X\(05\)70126-5](https://doi.org/10.1016/S0889-857X(05)70126-5)
20. Godse, A., Godse, A., & Shejwal, B. (2014). Effects of suryanamaskar on relaxation among college

- students with high stress in Pune, India. *International Journal of Yoga*.  
<https://doi.org/10.4103/0973-6131.146049>
21. Golden, C. J. (2004). Wechsler memory scale. In *Encyclopedia of psychology, Vol. 8*.  
<https://doi.org/10.1037/10523-098>
  22. Hasselmo, M. E. (2006). The role of acetylcholine in learning and memory. *Current Opinion in Neurobiology*. <https://doi.org/10.1016/j.conb.2006.09.002>
  23. Jakhotia, K. A., Shimpi, A. P., Rairikar, S. A., Mhendale, P., Hatekar, R., Shyam, A., & Sancheti, P. K. (2015). Suryanamaskar: An equivalent approach towards management of physical fitness in obese females. *International Journal of Yoga*. <https://doi.org/10.4103/0973-6131.146053>
  24. Javadekar, P., & Manjunath N. K. (2012). Effect of Surya Namaskar on Sustained Attention in School Children. *Journal of Yoga & Physical Therapy, 02(02)*, 2–5. <https://doi.org/10.4172/2157-7595.1000110>
  25. Joshua, S., & C Dunbar, C. (2016). Cardiovascular and Metabolic Responses to Vinyasa Yoga and Paced Surya Namaskar B. *Journal of Yoga & Physical Therapy*. <https://doi.org/10.4172/2157-7595.1000230>
  26. Kerketta Inder, Singh Kunvar, & Bisht Sunita. (2015). EFFECT OF SIX WEEKS TRAINING OF SURYANAMASKAR ON FLEXIBILITY AND AGILITY. *Review Of Research* .  
<https://doi.org/10.9780/2249894X>
  27. Kondam, A., Chandrasekhar, M., Punita, P., Varadharaju, B., Suresh, M., & Karthik, S. (2015). Combined effects of pranayama and suryanamaskar on dynamic spirometric values in normal young subjects. *National Journal of Physiology, Pharmacy and Pharmacology*.  
<https://doi.org/10.5455/njppp.2015.5.020920141>
  28. Kondam, A., W, N., N, J., K, J., M, S., & M, C. (2016). The effect of yoga in improved cognitive functions in medical students: A comparative study. *National Journal of Physiology, Pharmacy and Pharmacology*. <https://doi.org/10.5455/njppp.2016.6.0718414072016>
  29. Koopmann-Holm, B., & O'Connor, A. J. (2017). *Working memory. Working Memory*.  
<https://doi.org/10.4324/9781912282418>
  30. Li, A. W., & Goldsmith, C. A. W. (2012). The effects of yoga on anxiety and stress. *Alternative Medicine Review*.
  31. Markil, N., Geithner, C. A., & Penhollow, T. M. (2010). HATHA YOGA. *ACSM's Health & Fitness Journal*. <https://doi.org/10.1249/fit.0b013e3181ed5af2>
  32. Markowitsch, H. J., & Welzer, H. (2009). *The development of autobiographical memory. The Development of Autobiographical Memory*. <https://doi.org/10.4324/9780203866238>
  33. McClure, M. T., & McClure, M. T. (2006). Concentration. In *How to think in business*.  
<https://doi.org/10.1037/10968-011>
  34. McCorry, L. K. (2007). Physiology of the autonomic nervous system. *American Journal of Pharmaceutical Education*.
  35. Memory, V. (2007). Behavioral and Cognitive Neuroscience Reviews. *Behavioral and Cognitive Neuroscience Reviews*. <https://doi.org/10.1177/1534582304274070>
  36. Millington, R. A. (1964). PHYSIOLOGICAL RESPONSES TO COLD\*. *Weather*.  
<https://doi.org/10.1002/j.1477-8696.1964.tb02050.x>
  37. Olsson, H., & Poom, L. (2005). Visual memory needs categories. *Proceedings of the National Academy of Sciences*. <https://doi.org/10.1073/pnas.0500810102>
  38. Phadke, S. S. D., Joshi, R. S., & Yardi, S. (2014). Effect on Muscle-Power, Aerobic Capacity and Emotional State after Practice of Suryanamaskar. *International Journal of Physiology*.  
<https://doi.org/10.5958/j.2320-608x.2.1.008>
  39. Pradhan, B., & Nagendra, H. (2010). Immediate effect of two yoga-based relaxation techniques on attention in children. *International Journal of Yoga*. <https://doi.org/10.4103/0973->

6131.72632

40. *Research and Sustainable Business*. (2014). *Research and sustainable business*. Retrieved from [https://www.researchgate.net/profile/Asif\\_Syed/publication/323847258\\_Shopping\\_Experience\\_of\\_Customers\\_in\\_Organized\\_Retail\\_in\\_India\\_An\\_empirical\\_Study/links/5aaf7157458515e3e9b774/Shopping-Experience-of-Customers-in-Organized-Retail-in-India-An-empirical](https://www.researchgate.net/profile/Asif_Syed/publication/323847258_Shopping_Experience_of_Customers_in_Organized_Retail_in_India_An_empirical_Study/links/5aaf7157458515e3e9b774/Shopping-Experience-of-Customers-in-Organized-Retail-in-India-An-empirical)
41. Riley, D. (2004). Hatha yoga and the treatment of illness. *Alternative Therapies in Health and Medicine*.
42. Schacter, D. L. (1987). Implicit Memory: History and Current Status. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. <https://doi.org/10.1037/0278-7393.13.3.501>
43. Sengupta, P. (2012). Health Impacts of Yoga and Pranayama: A State-of-the-Art Review. *International Journal of Preventive Medicine*.
44. Shayna Rosenbaum, R., Kim, A. S. N., & Baker, S. (2017). Episodic and Semantic Memory. In *Learning and Memory: A Comprehensive Reference*. <https://doi.org/10.1016/b978-0-12-809324-5.21037-7>
45. Singh, S., Malhotra, V., Singh, K. P., Madhu, S. V., & Tandon, O. P. (2004). Role of Yoga in modifying certain cardiovascular functions in type 2 diabetic patients. *Journal of Association of Physicians of India*.
46. Singh, V., Sherpa, N., & Khandelwal, B. (2015). Psycho-neuro-endocrine-immune mechanisms of action of yoga in type II diabetes. *Ancient Science of Life*. <https://doi.org/10.4103/0257-7941.165623>
47. Singleton, M. (2010). *Yoga Body: The Origins of Modern Posture Practice*. *Yoga Body: The Origins of Modern Posture Practice*. <https://doi.org/10.1093/acprof:oso/9780195395358.001.0001>
48. Sinha, B., Ray, U. S., Sinha, T. D., Sciences, A., & Delhi, N. (2011). Physiological Study of, 17(3), 0–2.
49. Smith, C., Hancock, H., Blake-Mortimer, J., & Eckert, K. (2007). A randomised comparative trial of yoga and relaxation to reduce stress and anxiety. *Complementary Therapies in Medicine*. <https://doi.org/10.1016/j.ctim.2006.05.001>
50. Snowden, J. S. (2015). Semantic Memory. In *International Encyclopedia of the Social & Behavioral Sciences* (pp. 572–578). Elsevier. <https://doi.org/10.1016/B978-0-08-097086-8.51059-9>
51. Taneja, D. (2014). Yoga and health. *Indian Journal of Community Medicine*. <https://doi.org/10.4103/0970-0218.132716>
52. Telles, S., Raghavendra, B. R., Naveen, K. V., Manjunath, N. K., Kumar, S., & Subramanya, P. (2012). Changes in Autonomic Variables Following Two Meditative States Described in Yoga Texts. *The Journal of Alternative and Complementary Medicine*. <https://doi.org/10.1089/acm.2011.0282>

## Websites:

1. <http://theyogainstitute.org/surya-namaskar-salutations-to-the-sun/>
2. <http://www.ihealthu.com/magazine-details/surya-namaskar-for-the-mind-body-and-soul>
3. [https://books.google.co.in/books?hl=en&lr=&id=NDRGAAQBAJ&oi=fnd&pg=PT6&dq=surya+namaskar+on+memory&ots=x4j7QhvGDk&sig=F6jt\\_JAwzC-4XtmFTwC7ibUdfeg#v=onepage&q=surya%20namaskar%20on%20memory&f=false](https://books.google.co.in/books?hl=en&lr=&id=NDRGAAQBAJ&oi=fnd&pg=PT6&dq=surya+namaskar+on+memory&ots=x4j7QhvGDk&sig=F6jt_JAwzC-4XtmFTwC7ibUdfeg#v=onepage&q=surya%20namaskar%20on%20memory&f=false)
4. <http://www.geetganga.org/suryanamaskar-mantra>

## CHAPER 12: Appendix

### ➤ Integrated yoga module

45 minutes session for 15 days:

- I. Loosening practices..... 15 minutes
- II. Suryanamaskara practice..... 20 minutes
- III. Deep Relaxation Technique (DRT)..... 10 minutes

Loosening practice: (15min)

- Hand in and out breathing
- Hand stretch breathing
- Ankle stretch breathing
- Jogging
- Forward and backward bending
- Hip rotation
- Side bending
- Twisting

➤ **Informed concerned**

Certificate of consent

TITLE: “EFFECT OF SURYANAMASKARA ON HIGH SCHOOL STUDENTS FOR IMPROVING THEIR MEMEORY AND CONCENTRATION”

INFORMATION TO THE PARTICIPANTS:-

Present study aimed to measured “Effect of Suryanamaskara on improving memory and concentration in high school students attending the session in D.J.Doshi Gurukul College Of Commerce, Mumbai, Maharashtra for 15 working days training.

The complete session will take Forty Five Minutes. This study is expected not to cause any kind of serious or adverse effect on your physical and mental health.

Please NOTE that you have a right to refuse to give your consent, and this is not compulsory, please also note that the information you are going to divulge to us will be kept with utmost confidentially.

CONSENT:-

I have been informed about the procedure of the study. The possible risks and also the benefits have been explained to me as stated in the information. I have understood that I have right to refuse my consent of withdraw it any time during the study without adversely affecting my health. I am aware that by subjecting to this investigation, I have to give time to assessment by the investigation team and these assessment so not interfere with the benefits.

I----- the undersigned, give my consent to participate in this investigation /research program.

Signature of the investigation:-

Signature of the participant:-

Date:-

➤ **Six Letter Cancellation Test( SLCT)**

**Instructions:**

1. Search out target letter given below and cancel them by slash (/)
2. Cancel as many as possible within the given time.
3. Start and Stop only when told.

TARGET LETTERS: A, Q, T, N, P, G

A	X	D	N	T	O	X	Q	J	P	T	I	Z	F	N
V	A	U	I	C	P	A	G	H	A	J	K	O	T	C
H	Z	H	K	Z	I	F	Q	D	O	H	U	X	K	Z
I	D	K	O	P	M	J	X	I	E	S	C	G	H	P
L	G	G	Q	M	O	G	Q	H	I	K	P	A	X	Z
Y	Z	S	W	G	J	L	I	P	D	S	A	M	N	C
I	J	D	S	C	P	A	Z	V	Q	R	D	O	T	X
P	K	A	X	L	H	X	S	O	A	W	E	Y	P	T
T	I	Q	S	F	T	F	T	J	K	I	O	Q	U	I
R	R	Y	Y	Z	L	O	P	U	U	E	R	S	Q	H
K	H	R	T	Y	U	I	O	O	P	L	L	R	B	C
F	V	J	H	X	V	J	K	P	M	N	A	T	H	Q
S	V	K	S	Q	E	T	Y	H	S	S	P	E	J	R
W	B	O	A	A	V	B	C	M	F	N	Q	S	K	I
K	N	Q	A	Z	D	Q	I	F	G	H	K	P	I	U

Total Attempted:

Wrongly Attempted:

Net Attempted:

➤ **Wechsler Memory Scale (WMS)**

Following are the 10 words which were randomly selected.

1. Lime
2. Mango
3. History
4. June
5. Gandhi
6. One
7. Book
8. Chili
9. Roti
10. Pen

➤ **Raw Data :**

**Raw Data for Yoga Group:-**

SR. NO.	GENDER	NAME	SR NO	GENDER	GROUP	PRE_WMS	POST_WMS	PRE_SLCT_ATTEMPT	POST_SLCT_ATTEMPT	PRE_SLCT_WRONG	POST_SLCT_WRONG	PRE_SLCT_NET	POST_SLCT_NET
1	M	JA BH	YG_01	M	YOGA	6	8	15	52	0	0	15	52
2	M	DH BH	YG_02	M	YOGA	5	9	27	36	0	0	27	36
3	M	BH BH	YG_03	M	YOGA	6	8	37	31	0	0	37	31
4	M	DE BH	YG_04	M	YOGA	7	9	27	44	0	0	27	44
5	M	PR BH	YG_05	M	YOGA	6	9	29	61	0	5	29	56
6	M	MI CH	YG_06	M	YOGA	7	6	31	42	3	0	28	42
7	M	BH DE	YG_07	M	YOGA	6	10	38	45	0	0	38	45
8	M	YO GO	YG_08	M	YOGA	9	10	26	30	0	1	26	29
9	M	DH JA	YG_09	M	YOGA	9	8	32	54	1	5	31	49
10	M	DH JA	YG_10	M	YOGA	5	7	30	52	0	0	30	52
11	M	TU JA	YG_11	M	YOGA	6	8	29	43	0	0	29	43
12	M	PR JO	YG_12	M	YOGA	7	9	27	47	0	0	27	47
13	M	MA KA	YG_13	M	YOGA	4	6	36	71	0	24	36	47
14	M	HA KI	YG_14	M	YOGA	8	9	17	24	1	0	16	24
15	M	VA MA	YG_15	M	YOGA	6	8	23	34	0	0	23	34
16	M	HA MA	YG_16	M	YOGA	5	8	33	40	0	0	33	40
17	M	JE MA	YG_17	M	YOGA	3	8	28	35	0	3	28	32
18	M	SA RA	YG_18	M	YOGA	6	9	33	40	0	3	33	37
19	F	KR BH	YG_19	F	YOGA	6	7	18	29	0	2	18	27
20	F	KO BH	YG_20	F	YOGA	5	9	22	37	0	1	22	36
21	F	NI BH	YG_21	F	YOGA	5	10	13	48	0	0	13	48
22	F	SH BH	YG_22	F	YOGA	5	10	36	42	0	0	36	42
23	F	NI CH	YG_23	F	YOGA	4	10	13	55	0	0	13	55
24	F	MI SH	YG_24	F	YOGA	6	8	14	29	5	0	9	29
25	F	PR CH	YG_25	F	YOGA	5	7	36	42	0	0	36	42
26	F	IS FU	YG_26	F	YOGA	4	7	21	42	0	0	21	42
27	F	DE GA	YG_27	F	YOGA	5	9	40	35	0	0	40	35
28	F	LA GA	YG_28	F	YOGA	5	9	45	40	12	0	33	40
29	F	SA JA	YG_29	F	YOGA	4	8	17	43	0	0	17	43
30	F	NI JA	YG_30	F	YOGA	7	8	16	35	5	1	11	34
31	F	VE KO	YG_31	F	YOGA	6	8	33	45	0	0	33	45
32	F	KU LO	YG_32	F	YOGA	4	7	48	40	1	2	47	38
33	F	HA MA	YG_33	F	YOGA	5	7	36	55	0	0	36	55
34	F	VR ME	YG_34	F	YOGA	7	9	24	56	1	2	23	54
35	F	NI PA	YG_35	F	YOGA	6	8	22	46	0	0	22	46
36	F	PR PA	YG_36	F	YOGA	6	10	67	33	30	0	37	33
37	F	RI PA	YG_37	F	YOGA	6	8	16	60	0	0	16	60
38	F	SA RA	YG_38	F	YOGA	5	7	29	51	0	0	29	51
39	F	FI SH	YG_39	F	YOGA	6	10	33	40	0	0	33	40
40	F	AD TI	YG_40	F	YOGA	7	10	37	43	0	0	37	43

## Raw Data for Non-Yoga(control) Group:-

SR. NO.	GENDER	NAME	SR NO	GENDER	GROUP	PRE_WMS	POST_WMS	PRE_SLCT_ATTEMPT	POST_SLCT_ATTEMPT	PRE_SLCT_WRONG	POST_SLCT_WRONG	PRE_SLCT_NET	POST_SLCT_NET
1	M	JA BH	CG_01	M	CONTROL	6	6	20	32	2	2	18	30
2	M	DH BH	CG_02	M	CONTROL	5	6	22	30	1	0	21	30
3	M	BH BH	CG_03	M	CONTROL	5	5	32	33	1	0	31	33
4	M	DE BH	CG_04	M	CONTROL	6	6	27	31	2	3	25	28
5	M	PR BH	CG_05	M	CONTROL	4	5	20	31	0	3	21	28
6	M	MI CH	CG_06	M	CONTROL	7	6	26	40	1	2	25	38
7	M	BH DE	CG_07	M	CONTROL	4	5	33	36	0	1	33	35
8	M	YO GO	CG_08	M	CONTROL	8	8	22	30	4	1	18	29
9	M	DH JA	CG_09	M	CONTROL	7	6	20	42	5	0	15	42
10	M	DH JA	CG_10	M	CONTROL	7	7	24	35	9	3	15	32
11	M	TU JA	CG_11	M	CONTROL	4	5	29	32	5	1	24	31
12	M	PR JO	CG_12	M	CONTROL	8	8	27	44	2	6	25	38
13	M	MA KA	CG_13	M	CONTROL	6	7	16	30	4	7	12	23
14	M	HA KI	CG_14	M	CONTROL	6	6	20	38	6	9	14	29
15	M	VA MA	CG_15	M	CONTROL	4	4	29	36	5	6	24	30
16	M	HA MA	CG_16	M	CONTROL	9	8	29	45	0	6	29	39
17	M	JE MA	CG_17	M	CONTROL	6	6	30	36	0	8	30	28
18	M	SA RA	CG_18	M	CONTROL	9	9	26	34	3	5	23	29
19	F	KR BH	CG_19	F	CONTROL	8	8	34	36	2	2	32	34
20	F	KO BH	CG_20	F	CONTROL	7	7	35	42	1	6	34	36
21	F	NI BH	CG_21	F	CONTROL	5	5	20	26	0	1	20	25
22	F	SH BH	CG_22	F	CONTROL	6	6	27	31	3	1	24	30
23	F	NI CH	CG_23	F	CONTROL	4	5	21	29	3	6	18	23
24	F	MI SH	CG_24	F	CONTROL	5	5	30	33	6	2	24	31
25	F	PR CH	CG_25	F	CONTROL	4	5	24	25	2	3	22	22
26	F	IS FU	CG_26	F	CONTROL	6	6	19	22	1	3	18	19
27	F	DE GA	CG_27	F	CONTROL	7	7	34	36	1	5	33	31
28	F	LA GA	CG_28	F	CONTROL	7	7	26	29	7	3	19	26
29	F	SA JA	CG_29	F	CONTROL	8	8	22	29	0	3	22	26
30	F	NI JA	CG_30	F	CONTROL	4	4	31	33	0	1	31	32
31	F	VE KO	CG_31	F	CONTROL	4	4	29	30	6	4	23	26
32	F	KU LO	CG_32	F	CONTROL	4	4	23	32	1	1	22	31
33	F	HA MA	CG_33	F	CONTROL	6	6	30	40	5	2	25	38
34	F	VR ME	CG_34	F	CONTROL	6	5	24	26	2	3	22	23
35	F	NI PA	CG_35	F	CONTROL	7	6	31	34	3	6	28	28
36	F	PR PA	CG_36	F	CONTROL	6	5	28	36	5	4	23	32
37	F	RI PA	CG_37	F	CONTROL	6	6	19	30	6	2	13	28
38	F	SA RA	CG_38	F	CONTROL	8	8	27	29	6	1	21	28
39	F	FI SH	CG_39	F	CONTROL	6	7	26	29	9	0	17	29
40	F	AD TI	CG_40	F	CONTROL	6	6	30	38	6	6	24	32