EFFECTS OF CYCLIC MEDITATION IN PSYCHOMOTOR PERFORMANCE ON CHILDREN

Thesis submitted by

BALARAM PRADHAN

Towards the partial fulfillment of

DOCTOR OF PHILOSOPHY (YOGA)

DECEMBER 2011

SWAMI VIVEKANANDA YOGA ANUSANDHANA SAMSTHANA
(declared as Deemed University under Section 3 of the UGC Act, 1956)
BENGALURU - 560 019
INDIA

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Under the Guidance of

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I N D I A

C E R T I F I C A T E

This is to certify that Balaram Pradhan who has been given Ph.D. registration with effect from September 1st, 2009 by the Swami Vivekananda Yoga Anusandhana Samsthana, Deemed University under the Division of Yoga and Life Sciences has successfully completed the required 'training' in acquiring the relevant background knowledge in physiology, neurology and psychology related to Yoga and has completed the required 'course of research' for not less than two years to submit this thesis entitled **EFFECTS OF CYCLIC MEDITATION IN PSYCHOMOTOR PERFORMANCE ON CHILDREN** as per the regulations of the University.

We also declare that the subject matter of this thesis entitled **EFFECTS OF CYCLIC MEDITATION IN PSYCHOMOTOR PERFORMANCE ON CHILDREN** has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.

H.R. Nagendra M.E., Ph.D. Vice-Chancellor (Guide)	R. Nagarathna MD, FRCP (Edin.) Dean of Life Sciences (Co-guide)

Date:
Place: Bengaluru

D E C L A R A T I O N

I, hereby declare that this study was conducted by me at Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Bengaluru, under the guidance of Dr. H. R. Nagendra, Vice-Chancellor and Dr. R. Nagarathna, Dean of Life Sciences, Swami Vivekananda Yoga Anusandhana Samsthana, Deemed University, Bengaluru.

I also declare that the subject matter of my thesis entitled **EFFECTS OF CYCLIC MEDITATION IN PSYCHOMOTOR PERFORMANCE ON CHILDREN** has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.

Date: BALARAM PRADHAN

Place: Bengaluru (Candidate)

A C K N O W L E D G E M E N T

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Date:
Place: Bengaluru BALARAM PRADHAN

STANDARD INTERNATIONAL TRANSLITERATION CODE USED TO TRANSLITERATE SANSKRIT WORDS

a	=	अ	ṅa	=	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
ṁ	=	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

Background

The two-fold process in the Cyclic Meditation (CM) namely concentration as stimulation to break the stagnation of mind and sustained attention to calm down the distraction of the mind helps in the growth of practitioners. Six Letter Cancellation for the first and Digit Letter Substitution test for the second are apt tools tor their measures. No normality tools were available for Indian Students as also data related to use of CM for students. Hence, this study was taken up.

Aims

The aim was to 1) Establish the normative data for (a) Six Letter Cancellation Task (b) Digit Letter Substitution Task. 2) Study the effect of CM on (a) Six Letter Cancellation Task (b) Digit Letter Substitution Task.

Methods

The study was performed on school students (Male =528; Female = 315) with age range from 13 to 16 years group mean age ± S.D. (13.94±0.98). The base line data was used for the developing normative data. In the self as control design students were participated in two sessions, i.e. Cyclic Meditation (CM) and Supine Rest (SR) for a period of 22:30 min. Six Letter Cancellation Task and Digit Letter Substitution Task were administered before and immediately after each session.

Results and Discussions

Study on normative data

The present study was set out to obtain normative data (currently unavailable) for the school students between 9 and 16 years of age. The Six Letter Cancellation Task (SLCT) and Digit Letter Substitution Task (DLST) were used as measures of psychomotor performance of concentration and sustain attention, attention span and information processing speed.

For the SLCT the Multiple linear regressions provided a multiple R value of 0.538 with a corresponding R^2 determination index of 0.29, indicating that 29% of the score variance was explained by the combination of age and sex. The model equation was: SLCT score = -4.307 + 2.545×Age – 4.25×Sex.

For the DLST the Multiple linear regressions provided a multiple R value of 0.688 with a corresponding R^2 determination index of 0.474, indicating that 47% of the score variance was explained by the combination of age and sex. The model equation was: DLST score = -13.45+ 5.313×Age – 5.647×Sex.

The availability of the Indian normative data for the SLCT and DLST will allow wider application of this test in clinical practice.

Study effectiveness of CM

The Six Letter Cancellation Task study on 255 school going students showed after both practices, significant increased net scores. However, the magnitude of change was more after Cyclic Meditation than after Supine Rest (14.9% versus 11.56%). Following both practices, the net scores were significantly increases in gender and in different age groups. There were non-significant changes in whole, gender and in different age groups in scores for wrong cancellations after Cyclic Meditation and Supine Rest.

The Digit Letter Substitution Test was study on 249 school students. After both practices, the net scores were significantly increases, but these changes were not statisticaly significant. There were significant changes in scores for wrongly letter substitution after Cyclic Meditation and Supine Rest. Following both practices, the net scores were significantly increases in both sex gender and in age groups.

Conclusion

These results suggest that both CM and SR lead to improve in performance in this task. Further study requires following long-term practice and experience compared to novices.

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CHAPTER-1

Introduction

INTRODUCTION

Modern education system has many dividends in terms of increased IQ and cognitive abilities. Scientific openness to examine any hypothesis with no blind faith of acceptance or rejection has been the fore-manner of scientific revolution. Scientific methodology revolutionary for these purpose containing tools of hypothesis formulation, testing, observation by quantitative assessments, multi-centric repetition based on this acceptance or rejection of hypothesis is at the base of all great successes in the modern era of science and technology. While enhancement of IQ is the key for development of educational system, it is increasingly recognized that this alone will lead to great stresses which can result to health hazards including depression. While increased sensitivity and enhancement of speed are the key features for developing IQ it is recognized that control over speed and sensitivity are most necessary to combat stress and its hazards. Sustained attention with effortless ease is the key to gain this control. Cyclic meditation incorporates these two dimensions by use of keen observation of all charges going on in the body to begin with and in the mind, emotions late, the second dimension of relaxation and effortless ease in sustained awareness are built in CM processes to gain control over hypersensitivity and uncontrolled speed of cognitive processes. Solution to the challenges of depression and other hazards of stress has become an urgent need in the modern education system adding CM can be an effective tool in education. Further, deterioration of values is recognized more and more in the modern context and has been rooted in the removal of value education and emphasize on only rationality in our primary and secondary schooling.

Yoga is a traditional system of India postulated by Patanjali is his yoga aphorisms. The malady of deteriorated social and ethical values to enhanced/greed, though strong and violent attractions (rāga) and repulsions (dveṣa) in life, called as kleśas, this enhanced rāga and dveṣa. They are rooted in uncontrolled speeded up thoughts. Sage *Vāsiṣṭha* in his accomplished book called *Yogavāsiṣṭha* (LYV 3.6.32) defines yoga as a tool to calm down the mind मनः प्रशमनोपायः योग इत्यभिधीयते (*Manaḥ praśamanopāyaḥ yoga ityabhidhīyate)*

to gain control over the speed of mind. The slow movement in performance of *āsanas* in CM forces the speeding up of mind to slow down and come under control of the practitioner. Thus yoga removes the root cause for determined value system and offers effective tools for meeting the challenge.

Stress and stress related problems of health are becoming a challenge to mankind in all walks of life (Nagendra and Nagarathna, 1997). Stress being an internal response to demanding situations, it has become necessary for mankind to go into subtler understanding of the internal processes and find techniques for their management. The need for this type of works has also been felt over the last two to three decades as CAM (Complementary and Alternative Medicine) has become popular of which yoga has been found to be the fore-runner amongst all non-pharmacological modalities (Nagendra Nagarathna and Telles, 2000). Yoga has evolved as a system tool having a holistic conceptual basis, with a large repertoire of techniques that can be suitably selected for the individual's need. This has been used for therapeutic purposes or primarily for promotion of positive well-being at physical, mental, social or spiritual levels. Improvement in concentration and sustained attention are the basic requirement to move towards positive mental health.

Yoga as defined by Patanjali is to gain mastery over modification of the mind (योगः चित्तव्न्त्तिनिरोधः *Yogaḥ cittavṛttinirodhaḥ* removal of randomness of mind, develop concentration on the one hand while on the other hand it makes the mind steady and calm through sustained attention of *dhāraṇā* and *dhyāna*. *Āvartana dhyāna* or cyclic meditation (CM) is a technique developed in Vivekananda Yoga Anusandhana Samsthana (*Vyāsa*) as a module which combine the usefulness of yogāsanas through awareness of (sustained attention) the changes in the body and mind during the practice. The slow process involved in the performance of āsanas inhabits distractions to develop concentration. The relaxation of all groups of muscles associated with specific āsanas used in CM by relaxation techniques coupled with the above two aspect of concentration and sustained

attention, reduces the stress levels drastically. As much as 32% reduction in metabolic rate (MR) is found in just 30 minutes of the practice of CM (Telles, Reddy and Nagendra, 2000) in comparison to six hours of good sleep reducing only 9% in MR. Many studies on CM have shown that this drastic reduction of the stresses has improved brainwave coherence between the two hemispheres of the brain (Ganapath and Nagendra, 2010) enhanced the cognitive capabilities (Sarang and Telles, 2006) and improved sleep status (Sanjib and Telles, 2009).

Similarly, there are several studies on yoga that have shown the efficacy of different yoga practices on attention and concentration. Letter cancellation tests have been used for assessing different components involved in concentration through visual scanning, rapid response activation and inhibition in both healthy and the sick (Agarwal, Kalra, Natu, Dadhich and Deswa, 2002; Natu and Agarwal, 1997; Subramanyam and Telles, 2009). Digit Letter Substitution Test has been developed to assess sustained attention, visual scanning, and psychomotor speed which is useful as an easy and sensitive tool in a wide range of neurologic and neuropsychiatric disorders that may lack disorder specificity (Lezak, 2004).

Objective and quantitative measures to assess these two dimensions are necessary to evaluate the effectiveness of educational process. Probably the two tests SLCT and DLST could become effective tools for such measurements. Hence detailed study of these tools in the application of CM to children is taken up in this study.

CHAPTER-2

2.1 *LITERARY RESEARCH*

	LITERARY RESEARCH FROM YOGA TEXTS
2.1	**Concentration and *dhāraṇā***
2.8	**Sustained attention and *dhyāna***
2.10	**Cyclic Meditation**

The literature survey includes [a] literary search on all available traditional knowledge on '*dhāraṇā*' (focusing phase of meditation), one of the components of the intervention [cyclic meditation], used in this experimental study and [b] literature review of all the published scientific studies on CM and Six Letter Cancellation Task and Digit Letter Substitution Task.

Rationale of *Dhāraṇā*

Dhāraṇā is very often translated as concentration. In fact, it is very vague or not true translation. In general it is understood as ignorance of all except the chosen thought or object. Further it may be consider as a state of awareness or channelizing the thought process in a single direction avoiding distracted one.

Cyclic meditation is repetition of cyclic order of *dhāraṇā* and *dhyāna* phase of yoga. Cyclic meditation has the component of mental wakefulness, vigilance, concentration without getting disturbed by the distracted thought and reach to a state of mental equilibrium. This particular technique, where the practitioner trained himself by avoiding distracted thought (stress and tension) and holding on to the focused or attentive thought (Relaxation). The Six Letter Cancellation Task and Digit Letter Substitution Task are measurement of attention, concentration, vigilance and mental speed. These may influenced by CM training program which has design to heighten the mental equilibrium.

2.1 CONCEPT OF *DHĀRAṆĀ*

2.1.1 Introduction

First the word *dhāraṇā* appears in the *sādhana pāda* of *Patañjali's* yoga sutra while describing the eight limbs of yoga. First five angas plays an important role for removing the external cause of mental distraction. Uncontrolled emotions and desires are eliminated by practicing *yama* and *niyama*. *Ā*sana and pr*āṇā*y*ā*ma eliminates the disturbance arising from physical body. *Pratyāhāra* eliminates the disturbance created by sense organs. Then only mind is completely isolated from external world. Only such conditional practice of *dhāraṇā* is possible.

The Sanskrit word *dhāraṇā* stems from the verbal root *dhṛi*, meaning 'to hold, to fix. What is being held is one's attention, which is fixed on an internalized object and the underlying process is called *dhāraṇā*. *Dhāraṇā,* the sixth limb of the *Patañjali's* eightfold path is focusing of attention to a given place (*deśa*), which may be a particular part of the body (such as *cakra*) or an external object that is internalized (such as the image of a deity).

The definitions of *dhāraṇā* according to *Patañjali* and preparatory practices for *dhāraṇā* have been explored by the earlier work done by (Sarang, 2006; Naveen, 2005). Therefore, the present work is leading to the further deep understanding about the concept of *dhāraṇā* according to classical yogic and spiritual literature.

2.1.2 OBJECTIVES

The present review was conducted to compile authentic information on *dhāraṇā* and *dhyāna* from classical yogic and spiritual literature.

2.1.3 MATERIALS AND METHODS

2.1.3. A. Source Material

The traditional yogic and spiritual literature was reviewed. The sources for the present literary search include

A) Classical Yoga Texts (i) *Patañjali Yoga Sūtras, Vyāsa Bhaṣya o*n *Patañjali's* Yoga Sūtras (iii*) Bhagavad Gītā* (iv) *Gheraṇḍa Saṁhītā* and (vi) *Śiva Saṁhītā*.

B) Minor *Upaniṣads* (i) *Śāṇḍilya Upaniṣad* (ii) *Amṛtanādopaniṣat* (iii) *Yogatattvopaniṣat* (iv) *Maṇḍalabrāhmaṇopaniṣat*

2.1.3. B. Methods

The verses and relevant information about different aspects of *dhāraṇā*, from the above mentioned sources were first systematically compiled and then were sorted according to the defined structure of the sections. The relevant references are cited in the body of the text as well as in the reference section.

2.1.4 CONCEPT OF *DHĀRAṆĀ*

2.1.4.A. According to *Patañjali*

देशबन्धश्चित्तस्य धारणा ॥

Deśabandhaścittasya dhāraṇā.
"Concentration is the confining of the mind within a limited mental area (object of concentration)" (PYS: 3.1; Taimni, 2001).

Generally, *dhāraṇā* is translated as concentration. There is a difference between concentration and *dhāraṇā* defined by Yogic psychology. According to modern psychology the mind cannot be made to remain fixed on any object for any considerable time. It must remain moving even when concentration of the highest degree has been attained. According to yogic point of view it is the controlled movement of the mind within a limited sphere and by keeping the mind confined so it can reach a state in which all movement or change stops.

In *dhāraṇā* as this first stage is called, the mind is confined within a limited sphere defined by the object which is being concentrated upon. The phrase *deśabandha* means confinement within a territory which allows a limited freedom of movement. The mind in interned, as it were, within the limited mental territory and has to be brought back immediately if it goes out. The reason why a limited freedom of movement is possible when the mind is being concentrated upon a particular object will be seen if we remember that every object has innumerable aspects and the mind can consider these aspects only one by one. So that, while it takes up one aspect after another it is moving and yet really fixed on the object of concentration. Or it may be that the object may involve a process of reasoning consisting of many steps connected logically with each other and forming an integrated whole. Here also there can be movement without really leaving the object of concentration. It is only when the mind gets out of touch with the object and an unconnected and irrelevant object enters it that *dhāraṇā* therefore consists in keeping the mind continuously engaged in the consideration of the object and to bring it back immediately as soon as the connection is broken.

2.1.4.B. According to *Bhagavad Gītā*

मूध्न्यार्धायात्मनः प्राणमास्थितो योगधारणाम् ॥ ८-१२ ॥

mūdhnyārdhāyātmanaḥ prāṇamāsthito yogadhāraṇām || *8-12*||
(B G: 8-13; Swami Chinmayananda; 2002)
Having closed all the gates, having confined the mind in the heart, having fixed the life-breath in the head engaged in the practice of concentration.

Five sense organs are the five gates through which the external stimuli enter to the mental zone to agitate it. These five gates can be shut by discrimination and detachment. Then mind can confining to the heart. The term heart in Vedanta is a conceptual centre in the mind from where all positive and noble thoughts of love and tenderness, kindness and charity, devotion and surrender, constantly spring up. When the meditator's mind drawn away from sense-disturbances is purified with the divine thoughts, and when such mind is perfectly controlled and held steady by an intellect gushing out towards the contemplation of the Self. This existing mental condition is said to be yoga *dhāraṇam*.

2.1.4.C. According to *Maṇḍalabrāhmaṇopaniṣat*

विषयव्यावर्तनपूर्वकं चैतन्ये चेतःस्थापनं धारणं भवति ॥ १ ॥

Maṇḍalabrāhmaṇopaniṣat
viṣayavyāvartanapūrvakaṁ caitanye cetaḥsthāpanaṁ dhāraṇaṁ bhavati | || *1*||
(Thirty Minor Upanisads: K. Narayana Swami Aiyar, 2003)

The mind having drawn away from the objects of the senses, the fixing of chaitanya(consciousness) is *dhāraṇā*.

2.1.4.D. According to *Yogavāttika of vijñānabhiṣu*

नाभिचक्रे हृदयपुण्डरीके मुर्धनि ज्योतिषि नासिकाग्रे इत्येवमादिषु देशेषु वा विषये चित्तस्य वृत्तिमात्रेण बन्धः इति धारणा ॥१ ॥

nābhicakrehṛdayapuṇḍarīke murdhani jyotiṣi nāsikāgre ityebamādiṣu deśeṣu vā viṣaye cittsya bṛttimātreṇa bandha iti dhāraṇā|1|
Concentration is confinement of the mind in a place. The confinement of the mind by each operation, in such places as the navelspher, the lotus of the heart, the head, the

shining part, the forepart of the nose, the forepart of the tongue, etc or any external objects, in the concentration.

2.1.4.E. According to *Śāṇḍilya ūpaniśad*

शाण्डिल्य उपनिशत्

अथ धारणा।

सा त्रिविधा।

आत्मनि मनोधारणं दहराकाशे बाह्याकाशधारणं पृथिव्यप्तेजोवाय्वाकाशेषु पञ्चमूर्तिधारणं चेति॥ ९॥

Śāṇḍilya Upaniṣad
atha dhāraṇā।
sā trividhā।
ātmani manodhāraṇaṁ daharākāśe bāhyākāśadhāraṇaṁ pṛthivyaptejovāyvākāśeṣu pañcamūrtidhāraṇaṁ ceti ।। 9।।
(Thirty Minor Upanisads: K. Narayana Swami Aiyar, 2003)

It is of three kinds, fixing the mind in the ātma, bringing the *ākāśa* into the *ākāśa* of the heart and contempleting the five murtis (forms of *devatās*) in the five elements – *pṛitvi*, *āpas*, *agnī*, *vāyu* and *ākāśa*.

2.1.4.F. According to *Amṛtanādopaniṣat*

अमृतनादोपनिषत्

मनः सङ्कल्पकं ध्यात्वा संक्षिप्यात्मनि बुद्धिमान्।
धारयित्वा तथाऽऽत्मानं धारणा परिकीर्तिता॥ १६॥

Amṛtanādopaniṣat
manaḥ saṅkalpakaṁ dhyātvā saṅkṣipyātmani buddhimān। dhārayitvā tathā''tmānaṁ dhāraṇā parikīrtitā ।। 16।।
(Thirty Minor Upanisads: K. Narayana Swami Aiyar, 2003)

The union as a stated (done) by remaining without tremor in the hollow stalk (viz., *Suśumna*) alone is *dhāraṇa*. The yoga with the ordained duration of twelve *mātrās* is called *dhāraṇa*.

2.1.4.G. According to *Śiva Saṁhitā*

अस्मन्काले महायोगी पचंधा धारणं चरेत् ॥
येन भूरादिसिद्धिः स्यत्ततो भुतमेयपहा ॥६३ ॥
आधारे पकटिकाः पंच लिंगस्थाने तथैव च ॥
तदूध्वं पञ्च घाटिकाः नाभि हृन्मध्यके तथा ॥
भ्रूमध्योर्ध्वं तथा पंच घटिका धारयेत्सुधीः ।
तथा भूरादिना नष्टो योगीन्द्रो न भवेत्खलु ॥६४ ॥
मेधावी सर्वभूतानां धारणां यः समभ्यसेत् ।
शतब्रह्ममृतेनापि मृत्युस्तस्य न विद्यते ॥६५ ॥

Asmankāle mahāyogī pacandhā dhāraṇa caret||
Yena bhurādisiddhiḥ syattato bhutameyaepahā||63||
Ādhāre pakaṭikāḥ pañca liṅgasthāne tathaiva ca||
Tadūdhvaṁ pañca ghāṭikāḥ nābhi hṛnmadhyake tathā||
Bhrūmadhyordhvaṁ tathā pañca ghaṭikā dhārayetsudhīḥ|
Tathā bhūrādinā naṣṭo yogīndro na bhavetkhalu||64||
Medhāvī sarvabhūtānāṁ dhāraṇāṁ yaḥ samabhyaset|
Śatabrahmamṛtenāpi mṛtyustasya na vidyate||65||
(SS: Rai Bahadur Sirsa Chandra Vasu, 2003)

At that time let the great yogi practice the five fold *dhāraṇā* of concentration on Viṣṇu by which command over the five elements is obtained and fear of injuries from any one of them is removed.

Let the wise yogi practice *dhāraṇā* thus five *ghatis* (2 ½ hours) in the *ādhara* (*Mūlādhāra*), five *ghaṭis* in the seat of the linga (*Ṣvādhiṣṭhāna*), five ghaṭis in the above it (in the navel, *Maṇipura*), and the same in the heart (*Anāhāta*) and five *ghaṭis* in the throat (*Viśudha*) and lastly in the space between the two eyebrows (*Ajñāpura*). By this practice the elements cease to cause any harm to the great yogi.

The wise yogi , who thus continually practice concentration (*dhāraṇā*) never dies through the hundred of cycle of the *brahma*.

2.1.4.H According to *Gheranḍa Saṁhitā*

कथिता शाम्भवी मुद्रा शृणुष्व पञ्चधारणाम्।

धारणानि समासाद्य किं न सिध्यति भूतले ॥३।६८।

kathitā śāmbhavī mudrā śṛṇuṣva pañcadhāraṇām ।
dhāraṇāni samāsādya kiṁ na sidhyati bhūtale ।।3।68।
… …. … … … … ।।3।81।
(GS: Rai Bahadur Sirsa Chandra Vasu, 2003).

The ***Gheranḍa Saṁhitā*** describes types of *dhāraṇā*s from slokas. 68 to 81 of the third chapter. The meanings of the slokas have been taken here.

The *Śāmbhavī* has been explained; hear now the five *dhāraṇā*s. Learning these five *dhāraṇā*s, what cannot be accomplished in this world?

By this, with the human body one can visit and revisit *Svrga* loka, he can go wherever he likes, as swiftly as mind, he acquires the faculty of walking in the sky. These five *dhāraṇā*s are :- *pṛitvi* (earth), *āmbhasi* (watery), *vāyavi* (aerial), *āgneyi* (fiery), and *ākāsi* (etherial)

The *pṛitvi* – tattva has the colour of orpiment (yellow), the letter (la) is its secret symbol or seed, its form is four-sided, and *Brahmā*, its presiding deity. Place this tattva in the heart, and fix by *kumbhaki* the *prāṇa– vāyu* and the chitta there for the period of five *ghatikās* (2 ½ hours). This is call the *adhodhāraṇa*. By this, one conquers the earth, and no earthy-elements can injure him: and it causes steadiness.

He who practices this *dhāraṇā*, becomes like the conqueror of death; as an adept he walks over this earth.

The water-tattva is white like the kunda-flower of a conch or the moon, its form is circular like the moon, the letter (*Va*), is the seed of this ambrosial element, and *Viṣṇu* is its presiding deity. By yoga produce the water-tattva in the heart and fix there *prāṇa* with the *chitta* (consciousness), for five *ghatikas*, practising *kumbhaka*. This is watery *dhāraṇā*; it is destroyer of all sorrows. Water cannot injure him who practices this.

The *āmbhasi* is a great *mudrā*; the yogi who knows it, never meets death even in the deepest water. This should be kept carefully concealed. By revealing it success is lost, verily I tell you the truth.

The fire-tattva is situated at the navel, its colour is red like the indra-gop insect, its form is triangular, its seed is (ra) its presiding deity is *Rudra*. It is refulgent like the sun, and the giver of success. Fix the *prāṇa* along with the chitta with this tattva for five ghatikas. This is fire *dhāraṇā*, destroyer of the fear of dreadful death, and fire can not injure him.

If the practitioner is throws into burning fire, by virtue of this mudrā he remains alive, without fear of death.

The air–tattva is black as unguent for the eyes (collirium), the letter (ya) is its seed, and *Īśvara* is the presiding deity. This tattva is full of sattva quality. Fix the *prāṇa* and the chitta for five *ghatikas* in this tattva. This is vayavi–*dhāraṇā*. By this, the practitioner walks in the air.

This great mudrā destroyed the decay and death. Its practitioner is never killed by any aerial disturbances; by its virtue one walks in the air. This should not be taught to wicked or to those devoid of faith. By so doing success is lost; oh Chanda! This is verily the truth.

The ether tattva has the colour of pure sea-water, (ha) is its seed, its presiding deity is *Sadaśiva*. Fix the *prāṇa* with chitta for five ghatikas in this tattva. This is ether–*dhāraṇā*. It opens the gates of emancipation.

He who knows this *dhāraṇā* is the real yogi. Death does not approach him, nor does he perish at the *Pralaya*.

2.1.4.I. According to *Yogatattvopaniṣat*

योगतत्त्वोपनिषत्

Yogatattvopaniṣat

यस्य चित्तं स्वपवनं सुषुम्नां प्रविशेदिह ।

भूमिरापोऽनलो वायुराकाशश्चेति पञ्चकः ॥ ८३ ॥

Yasya cittaṁ svapavanaṁ suṣumnāṁ praviśediha ।
Bhūmirāpo'nalo vāyurākāśaśceti pañcakaḥ ।। 83।।
… …. … … … … ।। 102।।

(Thirty Minor Upanisads: K. Narayana Swami Aiyar, 2003)

The *Yogatattvopaniṣat* describes types of *dhāraṇā*s from slokas 83 to 201. The meaning of the slokas have been taken here.

There are five elements viz., *pṛitvi*, *āpas*, *agnī*, *vāyu*, and *ākāśa*. To the body of the five elements, there is the five fold *dhāraṇa*. From the feet to the knee is said to be the region of *pṛitvi*, is four–sided shape, is yellow, and has the *varṇa* (or letter) La. Carrying the breath with the letter La along the region of earth (from the foot to the knee) and completing with four faces and four mouths and of golden colour, one should perform *dhāraṇa* there for a period of two hours. Then, he attains the mastery over the earth. Death does not trouble him, since he has mastery over the earth elements.

The region of *āpa* is extended from knees to anus. *Āpas* is the semi-lunar in shape and white in colour, and has *Va* for its *beeja* letter. Carrying up the breath, with letter *Va*

along the region of āpas, he should contemplate on the god *Ṇārāyaṇa* having four arms and a crowned head, as being of the colour of pure crystal, as dressed in orange clothes and as decay less, and practicing *dhāraṇa* there for a period of two hours, he is freed from all sins. Then there is no fear for him from water, and he does not meet his death in water.

From the anus to the heart said to be the region of *agnī*. *Agnī* is triangular in shape, of red colour, and has the letter Ra for its (*bīja*) seed. Raising the breath made resplendent through the letter *Ra* along the region of fire, he should contemplate on the *Rudra*, who has three eyes, who grant all wishes, who is the colour of midday sun, who is daubed all over with holy ashes and who is of a pleased contenance. Practicing dhāraṇa there for a period of two hours, he is not burnt by the fire even though his body enters the fire–pit.

From the heart to the middle of the eyebrows is said to be the region of *vāyu*, *vāyu* is hexangular in shape, black in colour and shining with the letter *Ya*. Carrying the breath along with the region of vāyu, he should contemplate on the Īśvara the Omniscient, as possessing faces on all sides, and practicing *dhāraṇā* there for two hours, he enters *vāyu* and then ākāśa. The yogin does not meet his death through the fear of vāyu.

From the center of the eyebrows is to the top of the head is said to be the region of *ākāśa*, is circular in shape, smoky colour, and shining with the letter *Ha*. Raising the breath along the region of *ākāśa*, he should contemplate on Sadaśivā in the following manner, as producing happiness, as of the shape of *bindu*, as the great *deva*, as have shape of *ākāśa*, as shining like pure crystal, as wearing the rising crescent of moon on his head, as having five face ten hands and the three eyes as being of a pleased countenance, as armed with all weapons, as adorned with all ornaments, as having *Umā* (the goddess) in one half of this body, as ready to grant favors, and as the cause of all the causes. By practicing *dhāraṇa* in the region of *ākāśa*, he obtains certainly the power of levitating in the *ākāśa* (ether). Whenever he states, he enjoys supreme bliss. The proficient in yoga

should practice five *dhāraṇa*. Then his body becomes strong and he does not know death. That great-minded man does not die even during the deluged of *Brahmā*. Then he should practice *dhāraṇa* for periods of six *ghatīkās* (two hours, 24 minutes). Restraining the breath in (the region of) *ākāś* and contemplating on the deity who grant his wishes – this is said to be saguna *dhyāna* capable of giving (*siddhi*) *anima*.

2.1.5 Summary and Discussion

Most of the texts have interpreted *deśa* as a (physical) spot or place. Moreover the earlier commentators have specify that this spot is a physical spot, such as an object particularly and preferably a suitable part or organ of the body e.g. *hṛdaya* (heart), *bhṛu-madhya* (midbrow), *mūrdhnā* (apex of the cranium) or a deity i.e. an image of a god or goddess of one's own devotion.

For the purpose of *dhāraṇā* one should choose which will help the *sādhaka* in attaching and concentrating his *citta* on it without effort and naturally. So a subject for which the *sādhaka* has a natural liking or rather a deep devotion e.g. a god or goddess for which he has highest devotion or his guru or some such other saint would be easy for the objective of the meditation. When the *sādhaka* chooses such a subject, say for example *Rāma*, the natural thing that he is expected to do in the first stage of meditation i.e. *dhāraṇā* (which literally mean 'the process of holding' here, in the *citta*). There will be a process of thinking in some manner in the usual way about this subject *Rāma*.

In the beginning, when *sādhaka* will try to keep his mind and *citta* attached to the subject because of the fickleness of the mind, it will very soon leave the subject and very probably will be thinking of something else, not at all connected with *Rāma* in the least manner. This is the most usual experience of any novice, who starts an attempt at meditation. After a few days of such attempts of concentrating the mind, the wandering of the *citta* lessens. It may so happen that now, though the *citta* still wanders, yet the

thoughts and ideas that arise in the *citta* have always some connection with the subject *Rāma*. Thus, though the mind is wandering the awareness about *Rāma* is always present in the background, uninterrupted even for a moment. When such a state is reached, then only it can properly be called *dhāraṇā*.

Let us understand it through a simile of a vagrant animal tied to a post by a rope. Now that animal can move only in a limited region and is always bound with the post and never get disconnected from the post and go away anywhere or any distance from it. A definite circle, whose radius is the length of the chain and centre is the post, becomes the region fixed for the movement of the animal. The circumference of this circle would be the boundary of this sphere of movement. A similar thing occurs in the process of *dhāraṇā*. Then the duration for which such unbroken awareness of *Rāma* is present in the mind for that much duration *dhāraṇā* persists.

There are five *dhāraṇās* :- *pṛitvi* (earth), *āmbhasi* (watery), *vāyavi* (aerial), *āgneyi* (fiery), and *ākāsi* (etherial) and duration of *dhāraṇā* was five *ghatis* (2 ½ hours). He who practice *dhāraṇā* for 2 ½ hours on five elements acquires *siddhī* like fear of injuries from anyone, elements cease to cause any harm to the great yogi, never dies through the hundreds of cycle of the *brahma*. It causes steadiness, walks over this earth, destroyer of all sorrows, fire cannot injure him, walks in the air, death does not approach him, nor does he perish at the *Pralaya*.

In conclusion the uninterrupted single thought when broken by other thought then it is called *dhāraṇā* further its leads to *Samādhi.*

2.1.6 Summary table of definition according to yogic and spiritual texts.

	Definitions
PYS	देशबन्धश्चित्तस्य धारणा ॥
BG	मूध्न्यार्धायात्मनः प्राणमास्थितो योगधारणाम् ॥
MBU	विषयव्यावर्तनपूर्वकं चैतन्ये चेतःस्थापनं धारणं भवति ॥
YV	नाभिचक्रेहृदयपुण्डरीके मुर्धनि ज्योतिषि नासिकाग्रे इत्येबमादिषु देशेषु वा विषये चित्तस्य बृत्तिमात्रेण बन्ध इति धारणा ॥
AU	मनः सङ्कल्पकं ध्यात्वा संक्षिप्यात्मनि बुद्धिमान्। धारयित्वा तथाऽऽत्मानं धारणा परिकीर्तिता ॥

Note : PYS = *Patañjali yoga sūtras, Vyāsa bhaṣya o*n *Patañjali's* yoga sutras

BG = *Bhagavad Gītā*

MBU = *Maṇḍalabrāhmaṇopaniṣat*

YV = *Yogavāttika of vijñānabhiṣu*

AU = *Amṛtanādopaniṣat*

2.1.7 Table 2 Summary benefit of *dhāraṇā* on five elements according to *gheraṇḍa saṁhītā* and *yogatattvopaniṣat*.

		Gheraṇḍa Saṁhītā	*Yogatattvopaniṣat*
1	*Pṛitvi*	No earthy-elements can injure him. It causes steadiness, the conqueror of death and he walks over this earth.	Death does not trouble him, since he has mastery over the earth elements.
2	*Āmbhasi*	It is destroyer of all sorrows. Water cannot injure him. He never meets dead even in the deepest water.	He is freed from all sins. Then there is no fear for him from water, and he does not meet his death in water.
3	*Agnī*	He is destroyer of the fear of dreadful death, and fire cannot injure him. If he is throws into burning fire, he remains alive.	He is not burnt by the fire even though his body enters the fire–pit.
4	*Vāyu*	He walks in the air. Its practitioner is never killed by any aerial disturbances.	The yogin does not meet his death through the fear of vāyu.
5	*Ākāś*	It opens the gates of emancipation. Death does not approach him, nor does he perish at the Pralaya.	He obtains certainly the power of levitating in the *ākāś* (ether). Whenever he states, he enjoys supreme bliss.

The wise yogis, who thus continually practice concentration (*dhāraṇā*) never dies through the hundreds of cycles of the *brahma* (SS). Great yogi achieve the command over the five elements is obtained and fear of injuries from any one of them is removed (SS., GS). The proficient in yoga should practice five *dhāraṇa*. Then his body becomes strong and he does not know death. That great-minded man does not die even during the deluged of *Brahmā*.

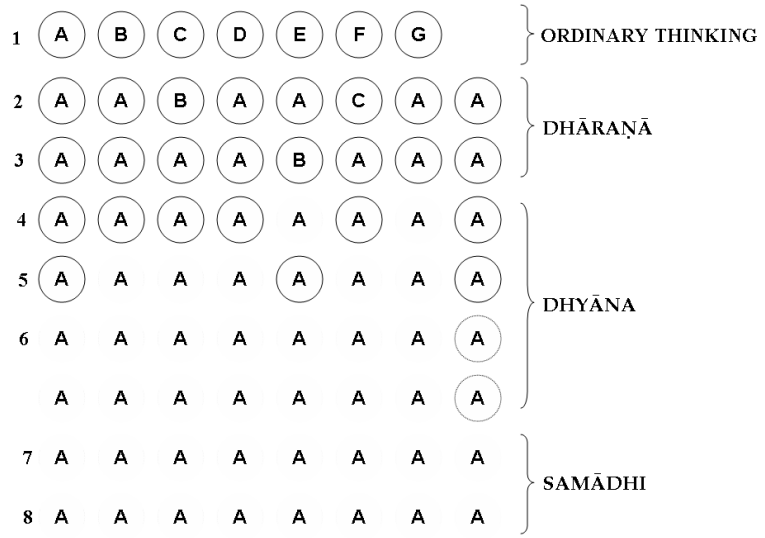
2.1.8 Sustained attention and *dhyāna*

When *dhāraṇā* gradually becomes effortless and mind is able to hold the chosen thought or object for longer duration then it becomes *dhyāna*. Moreover it can be understood that the capacity to increase the time with minimum efforts for a length of time is an example of sustained attention.

The mind dwells on the particular object for a length of time. This time factor determined the state of concentration or *dhāraṇā* and sustained attention or *dhyāna*. This has been illustrated in the Figure 2.1.1.

The difference between the three phases of the same process (*Cañcalatā, Dhāraṇā* and *Dhyāna*), which, culminates in s*amādhi* is illustrated schematically in Figure. 2.1.1 Schematic illustration of *Dhāraṇā*, *Dhyāna* and *Samādhi* (Reproduced from Taimni, 1961).

Figure. 2.1.1 Schematic illustration of *Dhāraṇā*, *Dhyāna* and *Samādhi*



If A is the object chosen for *dhyāna* and B, C, D, E. etc. are distractions, then the content of the mind at regular intervals of successive moments in the three phases may be represented by the above shown series of *pratyayās* in the mind. The circle around the letters represents mental self-awareness. It is seen that the frequency of distractions goes

on decreasing in *dhāraṇā* and the frequency and degree of mental self–awareness goes on decreasing in *dhyāna*. In s*amādhi* there is complete freedom both from distractions and self–awareness and the object alone remains in the field of consciousness.

Concept of *Dhyāna*

Earlier studies on concept of meditation (*Dhyāna*) by Sanjay (2010) on Om Meditation, four stages of meditation 1) Cancalata 2) Ekagrata, 3) Dharana, 4) *Dhyāna* were focused. Apart from another study on scriptural understanding of concept of Meditation (Subramanya, 2009), disturbed, dull, distracted, one-pointed and mastered are the five states of mind. Among the states of mind, for reaching higher state of consciousness one-pointed and mastered are essential. Meditation techniques are practiced for understanding the facts of mind. In the process of meditation, according to Vedanta the obstacles are lasting into a state of sleep, old thoughts, memories and tendencies and the violent attachment to a long forgotten experience of sense enjoyment. Further Sage Patanjali has mentioned obstacles such as disease, mental inertia, doubt, delusion, sloth, craving for sense enjoyment, false perception, and failure to concentration and falling away from concentration. Among the above mentioned obstacles, main barrier for gaining mastery over the mind are stupor and excitement. On the other hand Sage Gaudapada has given a solution such as to awaken the mind when it is dull, and slow down when agitated. The both calming and stimulating measures are the core and underlining mechanism absorbed in Cyclic Meditation

2.1.10. Cyclic Meditation

Cyclic meditation is repetition of cyclic order of *dhāraṇā* and *dhyāna* phase of yoga. Cyclic meditation has the component of mental wakefulness, vigilance, concentration without getting disturbed by the distracted thought and reach to a state of mental equilibrium. This particular technique, where the practitioner trained himself by avoiding distracted thought (stress and tension) and holding on to the focused or attentive thought (Relaxation). The Six Letter Cancellation Task and Digit Letter Substitution Task are measurement of attention, concentration, vigilance and mental speed. These may be influenced by CM training program which has design to heighten the mental equilibrium.

Cyclic meditation is based on a concept that a combination of both 'calming' and 'stimulating' measures help in reaching a state of mental equilibrium. It is derived from a statement in Sage *Gauḍapāda's* ***Māṇḍūkya Upaniṣat Kārikā:***

लये सम्बोधयेत् चित्तं विक्षिप्तं शमयेत् पुनः।
सकषायं विजानीयात् समप्राप्तं न चालयेत् ॥३.४४॥

Laye sambodhayet cittaṁ vikṣiptaṁ śamayet punaḥ,
Sakaṣāyaṁ vijñānīyāt samaprāptaṁ na cālayet. 3.44

'In a state of mental inactivity awaken the mind; when agitated, calm it; between these two states realize the possible abilities of the mind. If the mind has reached the state of perfect equilibrium then do not disturb it again'

(*Māṇḍūkya Upaniṣat Kārikā: 3.44*)

For the most persons the mental states while doing routine activities (not necessarily associated with yoga) is neither 'inactive' nor 'excited', but is somewhere between these extremes and hence a combination of 'awakening and calming' measures may be better suited to reach a balanced, relaxed state. The foregoing idea drawn from the traditional texts is the basis for this *yoga* practice called 'Cyclic Meditation'.

2.2 SURVEY OF THE SCIENTIFIC LITERATURE

2.2.1	**Relaxation and Cyclic Meditation studies**
2.2.2	**Cancellation tests**
2.2.3	**Substitution tests**
2.2.4	**Studies on Yoga using SLCT and DLST on normal volunteers**
2.2.5	**Study using Cancellation and substitution on patients and cognitive problems.**
2.2.6	**Summary tables of normative data, SLCT and DLST**

2.2.1. Relaxation and Cyclic Meditation Studies

Over the past thirty years or more, yoga and associated meditation techniques have come to be accepted as important means of reducing effects of stress (Haggerty, 1980). A wide variety of studies in this field have been done (Anderson, Liu and Kryscio, 2008, Nickel, Kettler, Muehlbacher et al., 2005). A meta-analysis by Eppley et al (1989) has brought out the beneficial effects of different relaxation techniques that included progressive muscular relaxation, biofeedback, relaxation, and mental imagery. The early hypothesis by Benson, Beary and Carol (1974) that there is a universal 'relaxation response' that is same for any technique has been convincingly refuted (Hankey, 2006). Another review concluded that different techniques produce different spectra of effect sizes on different performance tasks (Orme-Johnson and Walton, 1998). Rather it is recognized that each technique produces precise effects in specific brain regions, and the magnitude of benefit on a particular task depends on the extent to which that brain region is used in the performance.

Today, many of these techniques are well accepted and are widely taught to promote specific coping skills, particularly for professionally incurred stress. Such techniques are most effective when practiced daily for an extended period of time (Richter, 1984).These have been found useful in reducing a variety of stress-related symptoms, such as anxiety, neuroticism, depression, and hypertension. For example, 'Deep Breathing Meditation Exercise' has been reported to decrease anxiety, nervousness, self-doubt, and concentration loss (Paul, Elam and Verhulst, 2007).

In addition to reduction in stress symptoms, the beneficial effects of various relaxation techniques include: feeling of well-being, sense of calmness and relaxation in activity, improved sleep, less emotional reactivity, increased inner directedness (self-awareness), and improved self-care (Wall, 2005). Improved performance has also been found on a variety of psychological tests, such as IQ (Kumari, Nath and Nagendra, 2007), EQ(emotional intelligence), Tower of London Test for higher frontal lobe functions such as planning and execution (Uma, Nagendra, and Nagarathna et al., 1989; Manjunath and Telles, 2001), Baddley's Tests of Verbal and Spatial Memory (Manjunath and Telles,

2004; Naveen, Nagarathna R, Nagendra H R et al., 1997), Six Letter Cancellation Test (Sarang and Telles, 2007).

Cyclic Meditation (CM) developed at S-VYASA (Nagendra and Nagarathna, 1997), as a safe and simple stress management technique that can be easily understood and performed; it is suitable for subjects of all ages including school students. CM combines 'activating' and 'calming' practices. The concept for developing this meditation technique is described in *Mandukya Karika*, a text associated with *Mandukya Upanishad (Māṇḍūkya Upaniṣat Kārikā: 3.44*). This suggests that such a combination is helpful in achieving corrections at subtle psychological levels and move towards a state of long lasting mental equilibrium. CM has eight steps that consist of the practice of yoga postures (*asanas*) interspersed with three different types of relaxations in *shavasana,* the yogic supine posture.

Assuming a supine posture while doing a relaxation technique helps in faster recovery from induced physiological stress as compared to sitting in a chair (Bera, Gore and Oak, 1998). The practice of only the *Shavasana* has been found to reduce physiological arousal (Vempati and Telles, 2002), and help the practitioners cope with stress manifestations. Isometric relaxation technique (IRT) had done in supine posture forms an integral part of CM. A significant decrease in breath rate was noted after performance of this yoga-based Isometric Relaxation Technique (IRT), when compared to supine rest (Telles and Vempati, 1999).

During meditation, addition of very slow practice of yoga postures interspersed with different types of relaxation techniques seems to provide deeper physiological rest as observed by some of the studies on CM. It has been observed that during the yoga posture phase, predominantly sympathetic activation occurred, whereas after CM, the parasympathetic nervous system became dominant (Sarang and Telles, 2006). It has also been documented that, significantly better reductions in oxygen consumption occurred after the period of CM practice, as compared to an equal period of *shavasana* alone (Telles, Reddy and Nagendra, 2000; Sarang and Telles, 2006). The overall result of CM

was a greater reduction in energy expenditure than in *shavasana* (Sarang and Telles 2007). CM has been found to enhance the P300 wave in the evoked potential (Sarang and Telles, 2006), a fundamental cognitive process involving attention and immediate memory (Polich, Howard and Starr, 1983).

2.2.2 Cancellation tests

Cancellation tests have a long history in neuropsychological assessment. Most commonly, they are administered as paper-and-pencil tests that are normally used to assess a person's ability to visually search for an identifiable target and to either cancel or circle all such target items in an array. They vary widely in their complexity from long letter strings, such as the "H" Test and "A" Test or number strings like the "2 and 7 Cancellation" Test. (Ruff, Evans and Light, 1986). They may include symbols that are quite simple as in "Star Cancellation," (Halligan, Wilson and Cockburn, 1990) "Teddy Bear Cancellation" and "Symbol Cancellation" tests (Lowery, Ragl and Gur et al., 2004).

2.2.3 Substitution tests

Substitution tests are used as measures of the capacity for sustained attention, concentration, visual scanning, rapid response activation and inhibition (Lezak, 1995), mental flexibility, psychomotor speed, and speed of information processing (Van Hoof and Lezak, 1995). These tests are essentially speed--dependent tasks that require the subject to match particular signs – symbols, digits, or letters – to other signs within a specified time period. DLST was developed from Digit Symbol Substitution Test (DSST), one of the subsets of the Wechsler intelligence scale (Wechsler, 1981). The DLST has the advantage of using letters, digits and signs that are already well-known to those taking the test (Van Der Elst, Van Boxtel and Van Breukelen et al., 2006). The performance on these cancellation tests depends on their vigilance, motivation, and arousal as they visually scan the array and select appropriate responses while suppressing inappropriate ones (Sandson, Bachna and Morin, 2000).

Studies have used these tests to measure efficiency and speed of visual scanning (Geldmacher, 1996) or selective attention (Amieva, Lafont, Dartigues and Fabrigoule,

1999; Casco, Tressoldi and Dellantonio, 1998); others have administered them to assess potential hemispatial inattention and visual neglect (Adair, Na, Schwarza and Heilman, 1998; Aglioti, Smania, Barbieri and Corbetta, 1997), or motor perseverative behaviour (Na, Adair, Kang, Chung, Lee and Heilman, 1999). A recent study has used the symbol cancellation test as a measure of neglect, organizational processing and attention (Lowery, Ragland, Gur, Gur and Moberg, 2004).

2.2.4 Studies on Yoga using SLCT and DLST on normal volunteers

2.2.4A Studies on Six Letters Cancellation Task

There are four studies different interventional which has influenced on SLCT a measure of attention. One among these has matched paired control study on school boys and remaining three were cross over design on adult male group. Students studying under two educational system i.e. The Gurukula Education System (GES) and Modern Education System (MES) had positive improvement on SLCT but GES found to be better (Rangan, Nagendra and Bhatt, 2009). Yoga University students were assessed on the four different stages of meditation i.e. (i) Cancalata or non-targeted thinking and (ii) Ekagrata or focusing on a single topic (iii) Dharana or focusing on the symbol "OM" and (iv) Dhyana or an effortless single-thought (of OM) immediately before and after each session. Following Dharana and Chanchalata net SLCT score increased and decreased respectively whereas following other two had no influence score (Kumar and Telles, 2009). Well-trained volunteers following Cyclic Meditation and Supine Rest found higher to lower degree of changes in net SLCT score respectively and reduction in wrong score in former sessions but not in later sessions (Sarang and Telles, 2007).

2.2.4B Studies on Digit Letter Substitution Task

There were two studies available to us that evaluate immediate effect of different relaxation techniques on DLST, SLCT, and State anxiety. One study consisted of both male and female who were undergoing a month of Yoga Instructor's Course, participants were from different parts of the world. This study showed improvements in DLST, SLCT, and State anxiety scores following 20 minutes of Deep Relaxation Technique (Khemka, Rao and Nagarathna R, 2009). Similarly, experienced male yoga practitioner were participated in three different sessions i.e. Cyclic Meditation, Supine Rest, and

Control (no intervention) in equal period of time found significant enhancements of score in DLST, Letter Copying, and circle dotting task performance only after Cyclic Meditation whereas there were no changes occur seen following Control intervention (Subramanyam and Telles, 2009).

2.2.5 Study using Cancellation and Substitution on patients and cognitive problems

These neuropsychological test batteries have been used for the assessment of cognitive impairment in diseases such as alcoholic cirrhotic patients (Kapczinski, Curran and Przemioslo et al., 1996), to evaluate the deficits in patients who have undergone frontal lobectomy (Richer, Decary and Lapierre et al., 1993), brain-damage (Lewandowski, 1984), Schizophrenia (Van Hoof, Jogems-Kosterman and Sabbe et al., 1998) and depression (Morrens, Hulstijn and Van Hecke et al., 2006). Anorexia nervosa and bulimia nervosa patients were found to have impaired performance on the DST that improved effectively after treatment (Lauer, Gorzewski and Gerlinghoff et al., 1999).

2.2.5A. Study using SLCT and DLST on patients and cognitive problems

A previous study on 50 psychiatric inpatients (substance-related disorder, schizophrenia, bipolar, depressive, or anxiety disorders) had documented that these patients had lower scores than normal volunteers (Agarwal et al., 2002).

2.2.6 Summary tables of Normative Data, SLCT and DLST

NORMATIVE DATA SUBSTITUTION					
No.	**Author**	**Title**	**Key point**	**Strength of the study**	**Limitation of the study**
1	Van Der Elst, Van Boxtel, Van Breukelen, and Jolles (2006).	The Letter Digit Substitution Test: normative data for 1,858 healthy participants aged 24-81 from the Maastricht Aging Study (MAAS): influence of age, education, and sex	Letter Digit Substitution Test	Large sample size	aged 24-81 n=1,858
2	Sheridan, et. al., (2006)	Normative Symbol Digit Modalities Test performance in a community-based sample.	Symbol Digit Modalities Test	community-based sample	Low sample size
3	Joy, Fein, Kaplan, Freedman, (2000)	Speed and memory in WAIS-R-NI Digit Symbol performance among healthy older adults.	Digit Symbol	samples healthy older adults	177 (ages 50-90)
4	Selnes, et. al., (1991)	Normative data for a brief neuropsychological screening battery. Multicenter AIDS Cohort Study.	Symbol Digit Modalities Tests	n=733	Homosexual / bisexual men

NORMATIVE DATA CANCELLATION					
No.	**Author**	**Title**	**Key point**	**Strength of the study**	**Limitation of the study**
1	Lowery, Ragland, Gur, Gur and Moberg. (2004)	Normative data for the symbol cancellation test in young healthy adults.	symbol cancellation test	Age and education as predictors	n = 136
2	Uttl and Pilkenton-Taylor. (2001)	Letter cancellation performance across the adult life span.	cancellation test	healthy adults	n=351 with age range (18 to 91 years.
3	Wade, Wood and Hewer (1988)	Recovery of cognitive function soon after stroke: a study of visual neglect, attention span and verbal recall.	cancellation test	n =62	patients admitted to hospital and surviving 6 months

SIX LETTER CANCELLATION TASK (SLCT)					
No.	**Author**	**Title**	**Key point**	**Strength of the study**	**Limitation of the study**
1	Rangan, Nagendra and Bhatt (2009)	Effect of yogic education system and modern education system on sustained attention.	SLCT	Educational system	Convenient Sample, n = 49
2	Kumar and Telles (2009)	Meditative states based on yoga texts and their effects on performance of a letter-cancellation task.	Om meditation stages, SLCT	Self as control	Convenient Sample, n = 35
3	Sarang and Telles. (2007)	Immediate effect of two yoga-based relaxation techniques on performance in a letter-cancellation task.	CM, SLCT	Self as control	Convenient Sample, n = 69
DIGIT LETTER SUBSTITUTION TASK (DLST)					
No.	**Author**	**Title**	**Key point**	**Strength of the study**	**Limitation of the study**
1	Subramanya and Telles (2009).	Performance on psychomotor tasks following two yoga-based relaxation techniques.	cyclic meditation DLST	Self as control	Convenient Sample, n = 57
4	Khemka, Rao and Nagarathna R. (2009).	Immediate effects of two relaxation techniques on healthy volunteers.	DRT, DLST, SLCT	Self as control	Convenient Sample, n = 86

Based on the above literature survey it is evident that

(A) There was no normative data established for the Indian children for SLCT and DLST.

(B) There was no study found to examine the effect of Cyclic Meditation on SLCT and DLST on children.

These tests are (i) Simple and easy to administer (ii) Take very less time (iii) Well-developed and their reliability and validity were established. (iv) Application to Indian population. Further, there are no studies on the effect of CM in children. Hence it was planned to study changes on DLST, SLCT scores after CM in school students attending one of S-VYASA's summer vacation 10-day personality development camps.

CHAPTER-3

Aim and Objectives

3.1 AIM

This experimental study is aimed at establishing the normative values for Indian children for SLCT and DLST and to study the effect of Cyclic Meditation on these tests.

3.2 OBJECTIVES

1) Establishing the norms in children in the age group of 9 to 16 years and the six letter-cancellation test and digit letter substitution test.

2) Studying the effect of CM on SLCT and DLST in children of 13 to 16 years age of both sex.

3.3 RESEARCH QUESTIONS

Does cyclic Meditation enhance concentration and sustained attention in children as measured by SLCT and DLST ?

3.4 HYPOTHESIS

The hypothesis of this study was that the practice of cyclic meditation would enhance the psychomotor performance shown by SLCT and DLST.

The null hypothesis of this study was that the practice of cyclic meditation would not enhance the psychomotor performance as measured by SLCT and DLST.

3.5 RATIONALE OF THE STUDY

In previous studies cyclic meditation has shown drastic reduction of the stress level, improved brain wave coherence between the two hemispheres of the brain, enhanced the cognitive capabilities and improved the sleep status.

Hence, the present study was undertaken to study the effect of cyclic meditation on school children population on cancellation test, digit letter substitution test and also to establish the norm for the cancellation and substitution test.

CHAPTER-4

Methods

4.1	**SUBJECTS**
4.2	**DESIGN OF THE STUDY**
4.3	**INTERVENTIONS**
4.3	**VARIABLES STUDIED**

This thesis has two sections namely (1) Establishment of normative data for Six Letter Cancellation Task (SLCT) and Digit Letter Substitution Task (DLST) in Indian children population. (2) Effect of Cyclic Meditation on psychomotor performance task on (i) SLCT (ii) DLST a paper and pencil test.

4.1 SUBJECTS

4.1.1 Sample size

The sample size was calculated based on an effect size (2.22) obtained from a previous study of changes in Cyclic Meditation (Subramayam & Telles, 2009). It was calculated using G*Power software, Version 3.0.10 (Faul, Erdfelder, Lang, and Buchner, 2007), where the level was $\alpha = 0.05$, power $\beta = 0.95$ and the recommended sample size was 28 participants. The number of participants varied across the variables studied. The details are as follows:

4.1. 1. Table Numbers of subjects in each experiment

Sl. No.	Variable studied	No. of subjects*
1	Normative study on six letter cancellation	850
2	Normative study Digit letter substitution test	819
3	Six letter cancellation test	266
4	Digit letter substitution test	249

* Note: The number of subjects varied for different variables as it was not always possible for all subjects to attend all sessions.

4.1.2 Source of subjects

The participants were selected from residential (ten days) personality development camps conducted at the University campus of Swami Vivekananda Yoga Anusandhana Samsthana, Prashanti Kutiram, Bengaluru in the month of April 2007.

Table 4.1.2 Demographic data values are group mean ± SD of age.

	Age range	n	Female	N	Male	n	Total
SLCT	13 to 16 years	100	14.01±1.02	166	13.90±0.96	266	13.94±0.98
DLST	13 to 16 years	96	14.02±1.03	153	13.90±0.96	249	13.94±0.99

4.1.3 Inclusion criteria

(1) Students in the age range between 9 and 16 years.

(2) Normal healthy students based on their self report and report by parent/gaurdian.

(3) Proficient in English as the test materials used was in English language.

4.1.4 Exclusion criteria

A. Those with history of chronic health problems such as

(1) Bronchial asthma

(2) Rheumatic diseases

(3) Chronic headaches

(4) Mild anxiety

(5) Mild learning disabilities

(6) Epilepsy

(7) Taking any form of medication for any illness

(8) Those had undergone any residential yoga in the last three months.

4.1.5 Ethical consideration

Signed informed consent was obtained from the parents after describing the study protocol to them when they came for admitting the children to the camp. Students were asked to provide their consent just before participating in the camp.

4.1.6 Blinding and masking

Since this was yoga interventional study there was no scope for double blinding. However the masking was ensured by coding the answer sheets of the two sessions which were kept away for scoring only after the completion of the study. Also it was ensured that the researcher who did the scoring was blind to the intervention.

4.2 DESIGN OF THE STUDY

4.2.1 Structure of sessions

4.2.1.1 Normative data study

Baseline recordings were taken on the first day of the camp for both tests i.e. SLCT and DLST.

4.2.1.2 Cyclic meditation study

In this self as control design, the effect of cyclic meditation (CM) was compared to a control session of supine rest (SR). SR performed in corpse posture (*śavāsana*) was considered as control session for CM as recommended in earlier studies because this is the best known position for relaxation (Telles, Reddy and Nagendra, 2000; Sarang and Telles; 2006).

All students were trained in the practice of CM for seven days after they came to the campus as a part of their daily yoga practice and the assessments for this study were done on 9^{th} and 10^{th} days. All students were assessed just before and after the practice of two (CM and SR) sessions. Different set of test materials were used for all these four assessments. The test materials were prepared to ensure that none of the target letters/digits or their sequences in the answer section was repeated in these four sets. The tests were administered by the attending psychologist with the help of camp coordinators and volunteers who were the students of long term courses of the university. It was ensured that the two sessions were conducted at the same time of the day on consecutive days. All children completed the paper pencil test in sitting position just before and immediately after the session.

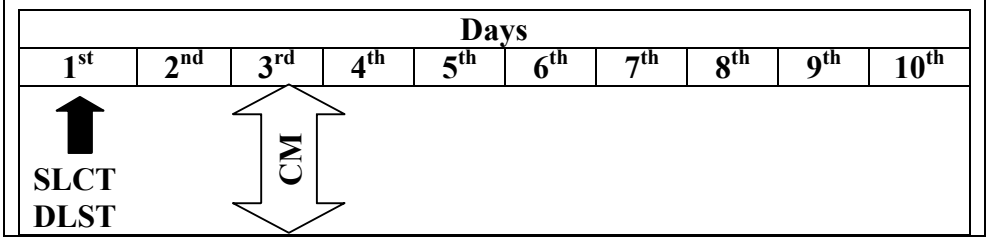
4.2.2 Order of sessions

The recordings were made on two consecutive days for each student. In order to avoid the influence of practice effect on our results (i.e. the expected result on the second day would be better than the first day due to familiarity and learning), the day of the session (CM and SR) was reversed. Students were randomly allotted to Group 1 and Group 2 to performe CM on 9^{th} day and SR respectively, and 10^{th} day sessions were reversed for the groups.

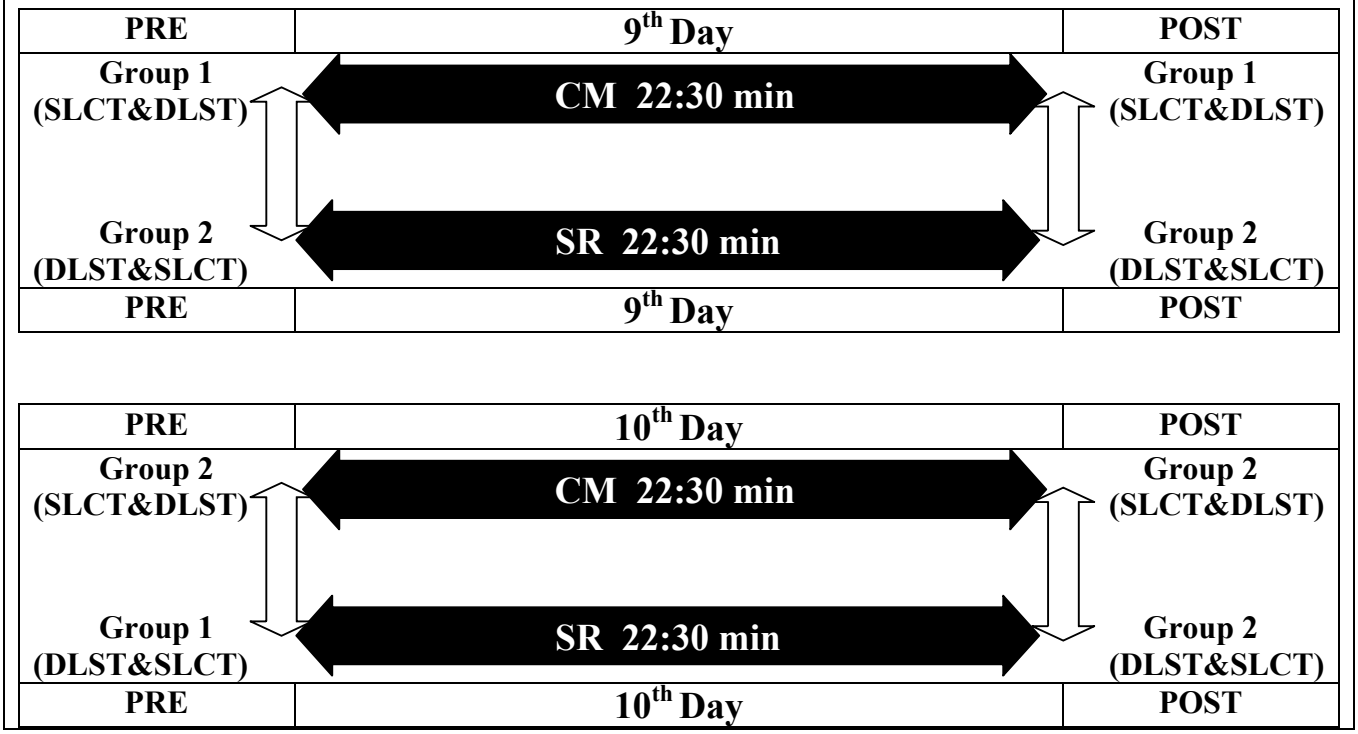
Table.4.2.2A Order of sessions Mean±SD of Subject participated in CM and SR (9th and 10th Day of Camp.

		SLCT		DLST	
Sessions	SEX	N	Mean±SD	n	Mean±SD
CM (9th Day)	Female	58	13.93±1.01	49	13.88±0.99
	Male	78	13.91±0.91	87	14.01±0.98
	Total	136	13.92±0.95	136	13.96±0.98
SR (10th Day)	Female	42	14.12±1.04	47	14.17±1.04
	Male	88	13.89±1.01	68	13.76±0.93
	Total	130	13.96±1.02	115	13.92±0.99

4.2.2.A Figure Study 1 for the normative values



4.2.2.B Figure Study 2 Effect of Cyclic Meditation



4.3 INTERVENTIONS

4.3.1 Cyclic Meditation

Throughout the Cyclic Meditation practice subjects kept their eyes closed, and followed the instructions from a pre-recorded audio CD that was played during the session. The instructions emphasized carrying out the practice slowly, with awareness and relaxation. The practice began by repeating a verse (0:40 min) from the yoga text, the *Muṇḍūkya Upaniṣat* (Chinmayananda, 1984); followed by isometric contraction of the muscles of the body ending with supine rest (1:00 min); slowly coming up from the left side and standing at ease (called *tāḍāsana*) and 'balancing' the weight on both feet, called centering (2:00 min); then the first actual posture, bending to the right (*ardhakaṭicakrāsana,* 1:20 min); a gap of 1:10 min in *tāḍāsana* with instructions about relaxation and awareness; bending to the left (*ardhakaṭicakrāsana,* 1:20 min); a gap as before (1:10 min); forward bending (*pādahastāsana,* 1:20 min); another gap (1:10 min); backward bending *(ardhacakrāsana*, 1:20 min); and slowly coming down in the supine posture with instructions to relax different parts of the body in sequence (10:00 min). The postures were practiced slowly, with awareness of all the sensations that are felt. The total duration of the practice was 22:30 min (Telles, Reddy and Nagendra, 2000). The key features of cyclic meditation are (i) postures interspersed with relaxation, (ii) slowness of movements, (iii) continuity, (iv) inner awareness, (v) feeling of heart-beat, changes in blood flow and sound resonance, and (vi) recognition of linear, surface, three-dimensional and all pervasive awareness. The principle of cyclic meditation and its practical details are elaborated in section in **Apendix-1.**

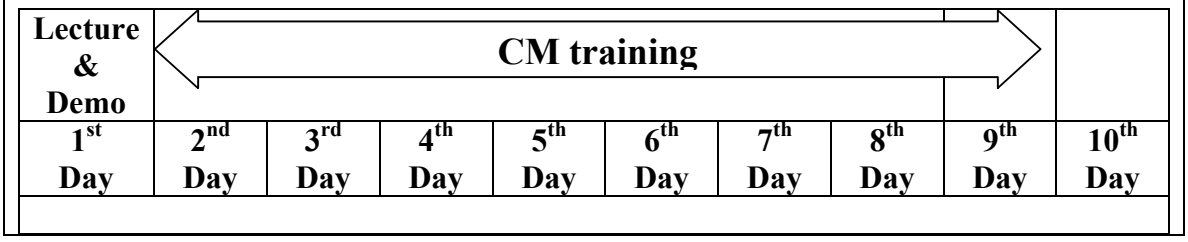
4.3.1 A Cyclic meditation session: Cyclic meditation period was in the supine position, followed by 22:30 minutes of the during period, where subjects were given cyclic meditation practice using taped instructions.

4.3.2 Supine rest session: During supine rest in the corpse posture (*śavāsana*), the subjects lay supine with legs apart and arms away from the sides of the body and with their eyes closed. This practice lasted 22:30 min, so that the duration was the same as for cyclic meditation. No instructions were given.

4.2.4.A Table Time spend for each step of cyclic meditation practice

Sl. No	Time spend for each step of cyclic meditation practice	Duration
1	Repeating a verse from the yoga text, the *Muṇḍūkya Upaniṣat*.	0:40 min
2	Followed by isometric contraction of the muscles of the body ending with supine rest called IRT.	1:00 min
3	Slowly coming up from the left side and standing at ease (called *tāḍāsana*) and 'balancing' the weight on both feet, called centering	2:00 min
4	Then the first actual posture, bending to the right (*ardhakaṭicakrāsana*) and returned to *Tāḍāsana*	1:20 min
5	Relaxation in *tāḍāsana* with instructions about relaxation and awareness	1:10 min
6	Bending to the left (*ardhakaṭicakrāsana*) and return	1:20 min
7	Relaxation in *tāḍāsana*	1:10 min
8	Forward bending (*pādahastāsana*) and return	1:20 min
9	Relaxation in *tāḍāsana*	1:10 min
10	Backward bending (*ardhacakrāsana*) returned to *Tāḍāsana*	1:20 min
11	Slowly coming down in the supine posture with instructions to relax different parts of the body in sequence DRT(Deep relaxation Technique)	10:00 min
	Total time taken to complete the Cyclic Meditation	**(22:30 min)**

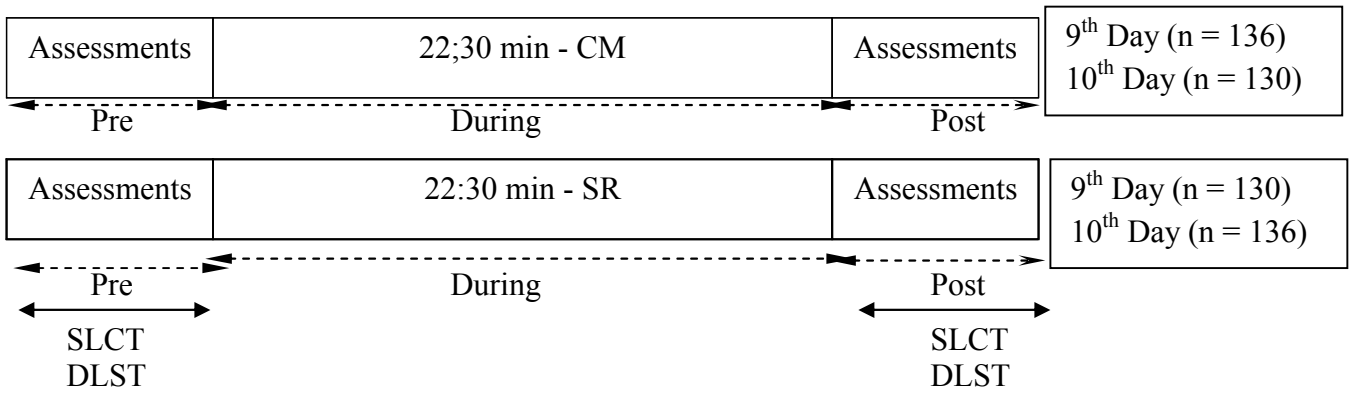
Figure 4.2.4.A Training program for the CM



4.2.4. B Supine rest session: Supine position, followed by 22:30 minutes of the period, where subjects were given supine rest in the corpse posture (*śavāsana*) without instructions. Thus in the present study, comparing the effects of practicing cyclic meditation and supine rest in a self as control design eliminated the possibility of subject

bias. Further, the order of the sessions (CM and SR) was alternated to eliminate the effect of first exposure to laboratory environment.

Figure 4.2.3 Time allocation within sessions.



The whole CM experiment was conducted on 6:00 am to 7:00 am.

4.3 VARIABLES STUDIED

4.3.1 Six Letter Cancellation Test (SLCT)

Cancellation tests require visual selectivity and a repetitive motor response. A six letter cancellation test was administered to assess functions such as selective and focused attention, visual scanning, and the activation and inhibition of rapid responses. The six letter cancellation test has been used in similar type of design on Indian population (Natu and Agarwal, 1997). A sample worksheet of six letter cancellation test is given in **Appendix-3**.

The six letter cancellation task worksheet consists of an array of random alphabets, A-Z, in 14 rows and 22 columns. Subjects are seated with the worksheet turned over until the start of the test. All participants tested in one group are also given a instruction sheet (coding sheet) indicating the six target letters to be cancelled. The instructions are given asking them to cancel as many target digits as possible in the specified time of 90 seconds. They are given the choice of cancellation strategy to do it horizontally,

vertically, or selecting a particular letter one at a time randomly in the array. Finally, after ensuring that they have understood the test by answering all their queries they are instructed to turn over the worksheet and start the test as the bell rings. Each test was timed for 90 seconds on a standard stopwatch.

4.3.2 Digit Letter Substitution Test (DLST)

Digit letter substitution test includes visual scanning, mental flexibility, sustained attention and psychomotor speed of information processing. Digit substitution test has been used in similar type of design on Indian population (Natu and Agarwal, 1997). A sample worksheet of digit letter substitution test is given in **Appendix-4**.

The DLST worksheet consists of an array of random digits,1-9, in 8 rows and 12 columns. The coding sheet has instructions about the test with example of substituting a specific letter for each digit 1-9, the same coding applying to an entire test group. Subjects were instructed to make their own choice of letter substitution strategy, whether horizontally, vertically, or selecting a particular digit randomly in the array one at a time. They were told to substitute as many target digits as possible in the specified time of 90 seconds.

4.3.2.A Testing procedure for SLCT and DLST

As participants in the yoga personality development camp, all students were trained in the practice of both CM and SR over the 7-day period preceding the start of the study. Rather than being a random control design, the study was self-controlled, with all study participants being measured before and after a period of CM, and before and after a similar period of SR. The two sets of measurements took place on successive days at the end of the yoga camp, days 9 and 10. In order to allow for any possible learning process that might have resulted from the first day's tests, the subjects were allocated randomly to two groups, with the first group doing CM on day 9 and SR on day 10, and the second group with the order reversed. Subjects were tested on the DLST, immediately before and after a session of CM of 22.30 minutes duration on one day, and immediately before and after an equal period of SR on the other day.

4.3.2.B Reliability and validity of the test

Reliability refers to the consistency of measurement which is reflected in the reproducibility of the scores. The digit letter substitution task has been evaluated for its reliability and validity based on standard criteria. Reliability is ascertained based on (i) temporal stability and (ii) internal consistency (Singh, 2002). To assess temporal stability the correlation coefficient was calculated using the published pilot data (Sarang and Telles, 2007) collected in twenty-nine male healthy volunteers 'without any intervention'. The correlation was made for the data collected before and after twenty-three minutes (Spearman's Correlation Coefficient). The variable for which the correlation was made (i.e., the net score) demonstrated the temporal stability ($r = .781$, $P = .002$). Since the digit letter substitution task comprises one variable, internal consistency cannot be calculated.

Validity concerns what the test measures and how well it does so. In the present study the digit letter substitution task is directly related to the cognitive performance of the person being examined. The digit letter substitution task measures psychomotor performance. Substitution tasks require cognitive performance, recognition, processing, integration, visual selectivity and a repetitive motor response. A digit letter substitution task was administered to assess functions such as selective and focused attention, speed of perception and processing, as well as a repetitive motor response requiring motor speed (Lezak, 1995). Hence it may be said that the content validity of this test is adequate for the purpose for which it is intended.

Reliability and validity of the cancellation and substittution tasks

David, Shuma, Ken, McFarlanda and John (1990) study the construct validity of eight attention tests using factor-analytic techniques. Among these the Letter Cancellation test, Digit Symbol test, Trial Making test, and Symbol Digit Modality tests were found to be comparable loading on a common factor, which indicate that they measures common construct. Letter cancellation tasks are paper and pencil tests widely used in clinical and research settings as quick measures of attention/concentration, visual-spatial scanning abilities, and visual-spatial dysfunctions such as spatial neglect. The co-relational

analyses show high reliability and provide evidence for validity of letter cancellation task (Uttl and Pilkenton-Taylor, 2001).

Table 4.3.2.B: Correlations analysis of the Substitution task with other motor tasks

		1	2	3	4	5	6
1	Digit Letter Substitution Total Trial 1						
2	Digit Letter Substitution Total Trial 2	0.96***					
3	Digit Letter Substitution Net Trial 1	0.99***	0.97***				
4	Digit Letter Substitution Net Trial 2	0.97***	0.99***	0.97***			
5	Dotting Task Left Circle	0.29*	0.36**	0.29*	0.34**		
6	Dotting Task Right Circle	0.27*	0.34**	0.271*	0.33*	0.99***	
7	Letter Copying	0.29*	0.34**	0.29*	0.32*	0.33*	0.36*

* $p<0.05$, **$p<0.01$, *** $p<0.001$, Pearson Correlation

Correlation analysis showed that strong association between Trial 1 and Trial 2 of both digit letter substitution task of total score ($r=0.96$, $p<0.001$) and net score ($r=0.97$, $p<0.001$). Based on the above observation DLST has strong, test re-test reliability.

The validity of DLST correlates with other measure of Letter Copying task (attention and repetitive motor response) motor speed (Letter Copying task).

Rationale DLST is an alternative of DSST. DLST key consisted of over learned sign that is Letters and digits. Participant has to learn only letter-digit association, whereas in other substitution test participants have to abstract symbols. This make performance relatively more dependent on memory and complex visual processes than it is in DLST. The rationale behind DLST development was to provide more specific measure of information processing. Both SLCT and DLST is specified time-tested task to measure the information processing.

Table 4.3.2.B 1 Commonality and difference of DLST and SLCT task

Sl. No.	Items	DLST	SLCT
1	Aim	To measure the psychomotor performance(Natu and Agarwal , 1997)	To measure the psychomotor performance (Natu and Agarwal, 1997)
2	What it Measures	Visual scanning, mental flexibility, sustained attention,	attention/concentration, visual-spatial scanning abilities, and

		psychomotor speed, and speed of information processing (Lezak, 1995)	visual-spatial dysfunctions such as spatial neglect.
3	Population	Normal (Natu and Agarwal, 1997) and Psychiaric patients (Agarwal AK et al. 2002)	Normal (Natu and Agrawal, 1997) and Psychiaric patients (Agarwal AK et al. 2002)
4	Validity	(Natu and Agrawal, 1995)	(Uttl and Pilkenton-Taylor, 2001).
5	Reliability (Test and Re-Test)	r = 0.97***, p <0.001 (Subramanyam and Telles, 2009)	r = .781, p = .002 (Sarang and Telles, 2007)
6	Connection to the brain	Primary motor cortex, Broca's , Wernicko's area, Primary visual cortex,	Primary motor cortex, Broca's , Wernicko's area, Primary visual cortex,

CHAPTER-5

Data Extraction and Analysis

5.1	**DATA EXTRACTION**
5.2	**DATA ANALYSIS**
5.3	**EFFECT OF CM ON SLCT AND DLST**

5.1 DATA EXTRACTION

SLCT: The total number of cancellations attempted, and the number wrongly cancelled were counted. Then net score is obtained by deducting the latter from the former (Natu and Agarwal, 1997).

DLST: The total number of substitutions attempted, and the number of wrong substitutions were counted. Then net score was obtained by deducting the latter from the former (Natu and Agarwal, 1997).

The answer sheets were coded and scoring was done by the researcher who was not involved in the study. It was cross checked by another researcher. Then entry was done in computer checking was done.

5.2 DATA ANALYSIS

The raw data obtained for each subject in each recording session were tabulated separately. Statistical analysis was done using SPSS (Version 10.0) in following steps:

Section 1: The normative procedure for NSLCT and NDLST are involved the fitting of multiple linear regression models adjusted for age (in years) and sex. The core assumptions of regression analysis (homoscedasticity, normal distribution of the residuals, absence of multicollinearity, and the absence of 'influential cases') were tested for each model. Homoscedasticity was evaluated by visual inspection of the scatter plots of the residuals on the predicted values. The normal distribution of the residuals was investigated by visual inspection of the histograms and the normal probability plots. The occurrence of multicollinearity was checked by calculating the Variance Inflation Factors (VIFs), which should not exceed 10 (Belsley, Kuh and Welsch, 1980). Cook's distances were computed to identify any possible influential cases. Normative data was then obtained by calculating the residuals for the NSLCT scores (e_i = observed score – predicted score). The residuals were then standardized ($Z_i = e_i$ / SD [residual]).

5.2.1 NORMATIVE DATA OF SLCT AND DLST

In the present study, the school students aged between 9 and 16 years (for NSLCT, mean age = 12.14; SD = 1.77, n=843; for DLST mean age = 12.14; SD = 1.78, n=819) were selected. Linear multiple regression models were fitted for the SLCT scores. The residuals were sufficiently normally distributed and no heteroscedasticity was observed. VIFs of the predictors in the regression models had a maximum value of 1.001, which is well below the cut-off value of 10.

The outliers had virtually no effect (maximum Cook's distance 0.04 and 0.02 for NSLCT and NDLST respectively) for both Tests i.e. NSLCT and NDLST, Table 5.2.1 presents the mean and standard deviation stratified by age and sex; Table 5.2.1. A represents the regression models. Age and sex had a significantly positive and negative ($P < 0.001$) influence on the predicted SLCT scores.

Combining these regression models with the standard deviations of the residuals provided the normative data. First, the predicted values of the scores (predicted y_i) for the SLCT and DLST were calculated by inserting the coded values of the predictor variables in the regression models [Table 5.2.1.B]. Next, the residuals of both scores were calculated (e_i = observed y_i – predicted y_i) and then standardized ($Z_i = e_i$ / SD (residual). The SD (residual) was 7.82 for NSLCTand 10.41 for DLST scores.

For NSLCT, Multiple linear regressions provided a multiple R value of 0.538 with a corresponding R^2 determination index of 0.29, indicating that 29% of the score variance was explained by the combination of age and sex. The model equation was: SLCT score = -4.307 + 2.545 × Age – 4.25 × Sex. This indicates that for each progressive year of age, the SLCT scores increase, on average, by 2.545 and decrease by -4.25 for each sex. These coefficients allowed us to calculate the correction scores to apply to individual subjects to consider the effects of age and sex. Table 5.2.1.C provides normative SLCT data based on the regression models in Table 5.2.1.B, stratified by age and sex with percentile values. Thus, the result of this study has shown that scores on SLCT go on increasing with increasing age in both sexes. Females had higher scores than males in the cancellation task performance.

For NDLST, Multiple linear regressions provided a multiple *R* value of 0.688 with a corresponding $R^{[2]}$ determination index of 0.474, indicating that 47% of the score variance was explained by the combination of age and sex. The model equation was: DLST score = –13.45+5.313×Age–5.647×Sex. This indicates that for each progressive year of age, the DLST score increases, on average, by 5.31 and decreases by –5.65 for each sex. These coefficients allowed us to calculate the correction scores to apply to individual subjects in order to consider the effects of age and sex. Table 5.2.1.C provides normative DLST data based on the regression models in Table 5.2.1.A stratified by age and sex.

Table 5.2.1: Total group data of Mean and Standard deviation

		N	Mean±SD
NSLCT	Male	505	22.37±8.71
	Female	314	26.73±9.54
	Total	819	24.04±9.27
NDLST	Male	528	45.21±13.66
	Female	315	51.42±14.68
	Total	843	47.53±14.36

Table 5.2.1.A: Mean and Standard deviation of Net Six Letter Cancellation Task and Net Digit Letter Substitution Task scores stratified by age and sex

		Female		**Male**	
	AGE (years)	***N***	**Mean ± SD**	***N***	**Mean ± SD**
NSLCT	9	10	16.2±6.36	17	13.06±5.03
	10	71	20.73±7.1	88	16.9±6.31
	11	41	23.41±6.7	84	20.62±6.21
	12	49	24.35±7.96	118	22.43±8.09
	13	66	31.23±9.33	74	23.7±7.63
	14	31	30.81±7.53	69	26.25±8.38
	15	37	34.54±9.13	43	29.93±9.87
	16	9	34.67±6.18	12	29.75±12.52
	Total	314	26.73±9.54	505	22.37±8.71
NDLST	9	10	35.5 ± 6.69	18	29.44 ± 6.01
	10	70	39.57 ± 9.76	93	34.02 ± 6.68
	11	41	43.46±10.14	98	39.08 ± 8.69
	12	50	48.74 ± 9.23	121	43.6 ± 9.69
	13	67	58.87±12.51	72	52.85±10.88
	14	31	57.1 ± 12.02	69	55.87±11.69
	15	36	66.94 ± 9.95	45	60.73 ± 16
	16	10	72.9 ± 10.31	12	56.58±11.45
	Total	315	51.42±14.68	528	45.21±13.66

Legend: NSLC= Net six letter cancellation Task, NDLST= Net Digit–Letter Substitution task

Table 5.2.1.B: Multiple linear regression models of the Net SLCT Task and Net DLST task scores with age and sex as predictors

	Variables	B	Std. Error	T	*P* values	Std B	VIF	$R^{[2]}$	SD (res.)
NSLCT	**Constant**	-4.307	1.932	-2.229	0.026			0.289	7.82
	Age	2.545	0.154	16.498	< 0.001	0.487	1.00		
	Sex	-4.250	0.563	-7.554	< 0.001	-0.223	1.00		
NDLST	**Constant**	–13.45	2.545	–5.285	<0.001			0.474	10.41
	Age	5.313	0.203	26.199	<0.001	0.656	1.001		
	Sex	–5.647	0.743	–7.604	<0.001	–0.190	1.001		

Legend: NSLC= Net six letter cancellation Task, NDLST= Net Digit–Letter Substitution task**;** Std B = Stanardized B; SD (res.) = SD (residuals)

Table 5.2.1.C: Raw percentile Scores of Net six letter cancellation Task and Net Digit–Letter Substitution Task stratified by age and sex

Variables	Percentile	FEMALE								MALE							
		AGE IN YEARS								AGE IN YEARS							
		9	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
NSLCT	**5**	5	8.6	9.7	11	18	18	23	26	7	7	12	10	12	14	13	10
	10	5.7	11	16	13	21	18	25	26	7	9	13	13	13.5	15	17	11.2
	25	12	16	19	19	25	25	30	30	8	13	16	18	19	21	22	21
	50	16	20	22	24	30	32	33	35	13	16	20.5	22	23	26	29	25
	75	23	27	29	32	38	34	39	38	17	22	24	27	29	33	35	41.8
	90	25	30	31	34	44	42	46	.	21	26	30	31	35	36	43	46.5
	95	.	32	36	38	48	44	54	.	.	28	33.8	36	36.8	39	49	.
NDLST	**5**	26	23.6	24	31.7	41	42	52	55	21	23	25	29	35.7	36	27	37
	10	26	26.1	28	34.2	45	43	54.7	56	21	25	27	30	38.6	41	46	37.3
	25	31	32.8	36	42.8	48	48	60	70	24.8	28	33.8	37	47	49	51	51.8
	50	36	40	45	50	59	55	65.5	73	30	34	39	44	53	56	60	55.5
	75	39	46	50	53.3	67	72	71.5	76	32	39	45	49	60	63	68	63
	90	48	53.9	53	61.9	72	74	81.9	94	37	42	50.1	57	63	72	86	74.1
	95	.	56.4	62	64	82	77	86.7	.	.	45	54	62	68.4	74	96	.

Legend: NSLC= Net Six Letter Cancellation Task, NDLST= Net Digit Letter Substitution Task

Section 2

5.3 EFFECT OF CM ON SLCT AND DLST

The group mean and standard deviation were calculated and data were tested for variance and normal distribution by F-test and Kolmogorov-Smirnov test respectively. For the normally distributed data, repeated measures analyses of variance (RMANOVA) were performed with two 'Within subjects' factors, i.e., Factor 1: Sessions; CM and SR and Factor 2: States; 'Pre' and 'Post'. These repeated measures ANOVA were carried out for each variable separately.

Subsequently, post-hoc tests with Bonferroni adjustment were performed to compare the data of the 'Post' periods with those of the respective 'Pre' period and also the different states were compared between sessions.

For data that were found to be not normally distributed, the following test was used

The Wilcoxon paired signed ranks test was performed to compare the data of the 'Post' periods with those of the respective 'Pre' periods.

The results of the variables studied of two yoga relaxation sessions i.e., cyclic meditation (CM) and supine rest (SR) are described under the following variables. These are (i) Six Letter Cancellation Test (ii) Digit Letter Substitution Test recorded pre and post intervention.

The total and net score pre data were analyzed using the repeated measure analyses of variance (RMANOVA). There was one Within Subjects Factor, i.e., States with two levels (pre and post) and one Between Subjects Factor, i.e., Groups with two levels (Cyclic Meditation and Supine Rest group). Post-hoc tests with Bonferroni adjustment were used to detect significant differences between mean values.

The data for wrong cancellations were not normally distributed (Kolmogorov-Smirnov test, $p > 0.05$). Hence, the non-parametric Wilcoxon paired signed ranks test was used for the comparisons within a group and also for between the groups (pre - post) (Cyclic Meditation and Supine Rest).

5.3.1 Six letter cancellation test

There was significant differences in between Sessions (CM Versus SR; p = 0.028) in total score and significant difference was found in states (pre-post) of sessions of total and net letter cancellation task, F (1, 265) = 277.44, p < 0.001. Post-hoc test with Bonferroni adjustment showed a significant increase in net scores after Cyclic Meditation and Supine rest compared to the respective pre scores (p <0.001). Wilcoxon paired signed ranks test showed a non-significant change in wrong cancellations after Cyclic Meditation and supine rest compared to the respective pre scores (p> 0.05). The group average values ± S.D. are given in **Table 5.3.1.A**.

Table 5.3.1.A Total score, net score and score for wrong cancellation in a six-letter cancellation task pre and post cyclic meditation and supine rest sessions; values are group mean ± SD.

Variables		Within Group					Between Groups	
		PRE	POST	% Chg	p values	ES	p values	ES
Total Score	CM	39.29 ±12.67	44.86 ±13.84***	14.18	0.001	0.84	0.028	0.09
	SR	39.26 ±12.29	43.67 ±13.6***	11.23	0.001	0.70		
Wrong Score	CM	0.5 ±1.27	0.61 ±1.48	22	1.543	0.06	0.241	0.03
	SR	0.62 ±1.81	0.57 ±1.64	-8.06	1.317	0.04		
Net Score	CM	38.79 ±12.74	44.25 ±13.85***	14.08	0.001	0.82	0.061	0.08
	SR	38.64 ±12.34	43.11 ±13.64***	11.57	0.001	0.71		

Abbreviations: ES = Effect Size; CM = Cyclic Meditation; SR = Supine Rest; Chg = Changes.

*** p < 0.001, Post-hoc tests with Bonferroni adjustment, Post scores compared with respective Pre scores. Note: There were significant improvement after both (CM and SR) sessions in total and net score.

In CM, the covariate NSLCT pre was significantly related to the NSLCT post, F(1, 263) = 871.87, p < 0.001. There was no significant effect of gender of NSLCT post after controlling the effect of NSLCT pre F(1,263) = 0.019, p < 0.890.In SR, the covariate

NSLCT pre was significantly related to the NSLCT post, F(1, 263) = 948.99, p < 0.001. There was no significant effect of gender of NSLCT post after controlling the effect of NSLCT pre F(1,263) = 0.221, p < 0.647. The gender group average values ± S.D. are given in **Table 5.3.1.B.**

In CM, the covariate NSLCT pre was significantly related to the NSLCT post, F(1, 261) = 829.26, p < 0.001. There was no significant effect of age of NSLCT post after controlling the effect of NSLCT pre F(1,261) = 0.019, p < 0.05. In SR, the covariate NSLCT pre was significantly related to the NSLCT post, F(1, 261) = 983.188, p < 0.001. There was also significant effect of age of NSLCT post after controlling the effect of NSLCT pre F(1,261) = 4.467, p < 0.01. Age group 13 was significantly differ from 14 years age group (p < 0.05), Bonferroni corrected post hoc ANCOVA. The age group average values ± S.D. are given in **Table 5.3.1.C.** The actual data of individual subjects in CM and SR are presented in (See Appendix-5).

Table 5.3.1.B. Total score, net score and score for wrong cancellation in a six-letter cancellation task pre and post cyclic meditation and supine rest; values are group mean ± SD of gender.

		FEMALE (n = 100)			MALE (n = 166)		
SESSIONS	**VARIABLES**	**PRE**	**POST**	**%**	**PRE**	**POST**	**%**
CM	**Total Score**	41.02 ±12.18	46.53 ±13.1***	13.43	38.24 ±12.88***	43.86 ±14.21***	14.70
	Score for wrong cancellation	0.7 ±1.82	0.7 ±1.78	0.00	0.39 ±0.76	0.55 ±1.27	41.03
	Net Score	40.34 ±12.4	45.8 ±13.16***	13.53	37.86 ±12.88	43.31 ±14.21***	14.40
SR	**Total Score**	41.9 ±12.72	46.1 ±12.89***	10.02	37.66 ±11.79	42.2 ±13.85***	12.06
	Score for wrong cancellation	0.76 ±2.43	0.81 ±2.44	6.58	0.54 ±1.3	0.43 ±0.83	-20.37
	Net Score	41.17 ±12.71	45.36 ±12.93***	10.18	37.12 ±11.89	41.75 ±13.91***	12.47

*** *P* <.001, Post-hoc tests with Bonferroni adjustment, Post scores compared with respective Pre scores.

Note: There were significant improvements after both (CM and SR) sessions in total and net but in wrong score increased following SR.

Table 5.3.1.C. Total score, net score and score for wrong cancellation in a six-letter cancellation task pre and post cyclic meditation and supine rest; values are group mean ± SD of age.

		Cyclic Meditation			Supine Rest		
AGE	**VARIABLES**	**PRE**	**POST**	**%**	**PRE**	**POST**	**%**
13 (n=114)	**Total Score**	36.75 ±11.69	42.6 ±13.36***	15.92	38.11 ±12.19	41.3 ±14.2***	8.37
	Score for wrong cancellation	0.5 ±0.88	0.65 ±1.32	30	0.68 ±1.39	0.56 ±1.3	-17.65
	Net Score	36.27 ±11.68	41.94 ±13.34***	15.63	37.43 ±12.23	40.78 ±14.18***	8.95
14 (n=77)	**Total Score**	38.25 ±12.12	44.14 ±13.14***	15.4	37.47 ±10.59	43.95 ±12.68***	17.29
	Score for wrong cancellation	0.51 ±0.93	0.69 ±1.91	35.29	0.82 ±2.79	0.68 ±2.45	-17.07
	Net Score	37.74 ±12.12	43.42 ±13.09***	15.05	36.65 ±10.63	43.27 ±12.84***	18.06
15 (n=52)	**Total Score**	44.83 ±12.05	50.29 ±12.7***	12.18	43.6 ±12.56	47.52 ±12.73***	8.99
	Score for wrong cancellation	0.5 ±2.25	0.38 ±0.63	-24	0.25 ±0.52	0.35 ±0.74	40
	Net Score	44.33 ±12.54	49.9 ±12.64***	12.56	43.38 ±12.54	47.17 ±12.73***	8.74
16 (n=23)	**Total Score**	42.78 ±16.3	46.26 ±17.87*	8.13	41.13 ±15.44	45.74 ±13.91**	11.21
	Score for wrong cancellation	0.52 ±0.9	0.61 ±1.95	17.31	0.52 ±1.16	0.78 ±1.2	50
	Net Score	42.26 ±16.13	45.7 ±18.1*	8.14	40.61 ±15.21	44.91 ±13.8**	10.59

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, Post-hoc tests with Bonferroni adjustment, Post scores compared with respective Pre scores.

Note: There were significant improvement after both (CM and SR) sessions in total and net score.

5.3.2 Digit letter substitution test

The group means values and standard deviation for total scores, scores for wrong substitutions and net score after Cyclic Meditation and Supine Rest sessions are given in **Table 5.3.2.**

There were no significant differences between sessions of net digit letter substitution task, with F (1, 248) = 1.029, p > 0.05.There was also significant difference in states (pre-post) of sessions of net letter substitution task with F (1, 248) = 21.05 and p < 0.001. Post-hoc test with Bonferroni adjustment showed a significant increase in net scores after Cyclic Meditation and Supine rest compared to the respective pre scores (p <0.001). The group average values ± S.D. are given in **Table 5.3.2.A.**

Table 5.3.2.A. Total score, net score and score for wrong substitution in a digit-letter substitution task pre and post cyclic meditation and supine rest sessions; values are group mean ± SD.

		PRE	POST	% Chg	p values	ES	p values	ES
Total Score	**CM**	59.97 ±10.98	62.33 ±13.26***	5.53	<0.001	0.25	0.088	0.099
	SR	57.17 ± 12.28	61.07 ±11.95***	9	<0.001	0.42		
Wrong Score	**CM**	0.08 ±0.29	0.24 ±0.79***	383.33	0.002	0.20	0.675	0.071
	SR	0.12 ±0.46	0.31 ±1.12***	292.31	0.006	0.19		
Net Score	**CM**	59.77 ±11.02	62.02 ±13.27***	5.21	<0.001	0.24	0.103	0.097
	SR	57.08 ±12.29	60.80 ±11.98***	8.53	<0.001	0.40		

Abbreviations: ES = Effect Size; CM = Cyclic Meditation; SR = Supine Rest; Chg = Changes

*** p<0.001, Post-hoc tests with Bonferroni adjustment, Post scores compared with respective Pre scores. ** p < 0.

Note: There were significant improvements after both (CM and SR) sessions in total, wrong, and net score.

There was no significant difference between sessions (CM and SR). There were no significant increase in wrong scores in the both CM and SR.

In CM, The covariate NDLST pre was significantly related to the NDLST post, $F(1, 246) = 222.265$, $p < 0.001$. There was no significant effect of gender of NDLST post after controlling the effect of NDLST pre $F(1, 246) = 0.062$, $p > 0.05$.

In SR, The covariate NDLST pre was significantly related to the NDLST post, $F(1, 246) = 170.089$, $p < 0.001$. There was no significant effect of gender of NDLST post after controlling the effect of NDLST pre $F(1, 246) = 0.156$, $p > 0.05$. The gender group average values ± S.D. are given in **Table 5.3.2.B.**

In CM, The covariate NDLST pre was significantly related to the NDLST post, $F(1, 244) = 112.02$, $p < 0.001$. There was no significant effect of age of NDLST post after controlling the effect of NDLST pre $F(1, 244) = 0.139$, $p > 0.05$.

In SR, The covariate NDLST pre was significantly related to the NDLST post, $F(1, 244) = 152.516$, $p < 0.001$. There was no significant effect of age of NDLST post after controlling the effect of NDLST pre $F(1, 244) = 1.058$, $p > 0.05$. The age group average values ± S.D. are given in **Table 5.3.2.C**. The actual data of individual subjects in CM and SR are presented in (See Appendix-5).

Table 5.3.2.B. Total score, net score and score for wrong substitution in a digit-letter substitution task pre and post cyclic meditation and supine rest; values are group mean ± SD of gender.

		FEMALE (n = 96)			MALE (n = 153)		
SESSIONS	**VARIABLES**	**PRE**	**POST**	**%**	**PRE**	**POST**	**%**
CM	**Total Score**	60.90 ±10.64	63.02 ±14.25 *	3.49	59.39 ±11.18	61.90 ±12.62**	4.23
	Score for wrong substitution	0.05 ±0.22	0.11 ±0.41	120.00	0.09 ±0.33	0.31 ±0.94**	242.86
	Net Score	60.84 ±10.68	62.72 ±14.22	3.08	59.09 ±11.21	61.58 ±12.66**	4.20
SR	**Total Score**	59.41 ±12.52	62.72 ±12.47**	5.58	55.77 ±11.96	60.04 ±11.54***	7.65
	Score for wrong substitution	0.09 ±0.41	0.17 ±0.54	77.78	0.13 ±0.50	0.39 ±1.35**	200.00
	Net Score	59.36 ±12.56	62.52 ±12.45*	5.32	55.64 ±11.94	59.71 ±11.58***	7.32

*p <0.05; **p<0.01; *** p <.001, Post-hoc tests with Bonferroni adjustment, Post scores compared with respective Pre scores. Note: There were significant improvement after both (CM and SR) sessions in total, and net score.

There was no significant difference between sessions (Male and Female)

Table 5.3.2.C. Total score, net score and score for wrong substitution in a digit-letter substitution task pre and post cyclic meditation and supine rest; values are group mean ± SD of age (n=249).

		Cyclic Meditation			Supine Rest		
AGE	**VARIABLES**	**PRE**	**POST**	**%**	**PRE**	**POST**	**%**
13 (n=105)	**Total Score**	58.21 ±9.04	61.43 ±13.17**	5.53	54..62 ±11.75	59.53 ±11.45***	9.00
	Score for wrong substitution	0.06 ±0.23	0.28 ±0.91**	383.33	0.12 ±0.41	0.49 ±1.51**	292.31
	Net Score	58.13 ±9.09	61.16 ±13.23**	5.21	54.50 ±11.75	59.14 ±11.45**	8.53
14 (n=74)	**Total Score**	58.59 ±10.56	61.03 ±12.99*	4.42	55.74 ±10.72	58.80 ±10.01**	7.71
	Score for wrong substitution	0.09 ±0.34	0.30 ±0.86	222.22	0.12 ±0.52	0.20 ±0.79	83.33
	Net Score	58.50 ±10.51	60.45 ±12.96	3.62	55.62 ±10.70	58.59 ±10.21***	7.55
15 (n=48)	**Total Score**	65 ±11.15	65.77 ±11.86	1.18	62.69 ±11.63	65.67 ±11.64	4.75
	Score for wrong substitution	0.08 ±0.35	0.08 ±0.28	0.00	0.06 ±0.43	0.15 ±0.55	150.00
	Net Score	64.29 ±11.71	65.69 ±11.83	2.18	62.63 ±11.55	65.52 ±11.58	4.61
16 (n=22)	**Total Score**	62.05 ±16.35	63.55 ±16.64	3.02	62.14 ±16.13	66.05 ±16.78**	8.24
	Score for wrong substitution	0.09 ±0.29	0.18 ±0.59	88.89	0.18 ±0.59	0.14 ±0.47	-23.53
	Net Score	61.95 ±16.24	63.36 ±16.43	2.89	62.18 ±16.30	65.77 ±16.58**	7.73

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, Post-hoc tests with Bonferroni adjustment, Post scores compared with respective Pre scores. ** $p < 0.01$;

Note: There were no significant improvement amongs the different age groups (13, 14, 15 and 16) in between (SR and CM) sessions in total, and net score of 13, 14, 15, and 16 years age groups.

CHAPTER-6

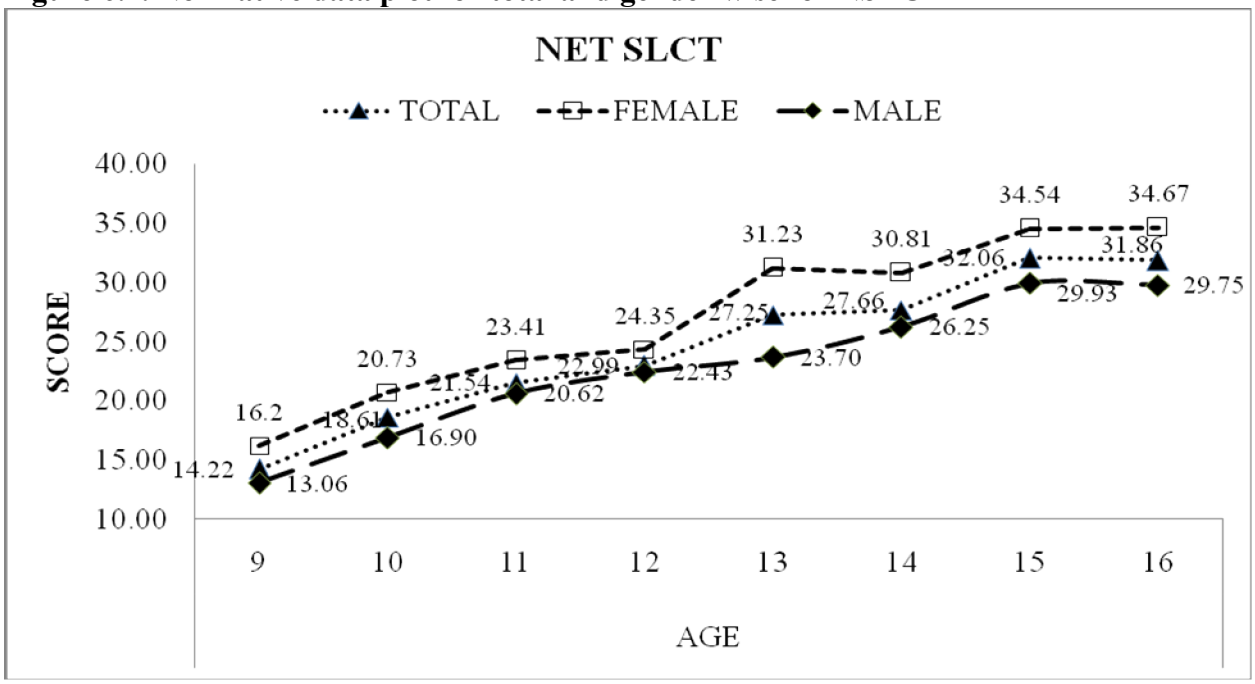
Results

Section 1	
6.1	**NORMATIVE DATA OF SLCT**
6.2	**NORMATIVE DATA OF SLCT**
Section 2	
6.3	**EFFECT OF CM ON SLCT**
6.4	**EFFECT OF CM ON DLST**

6.1 NORMATIVE DATA OF SLCT

The model equation was: SLCT score = -4.307 + 2.545 × Age – 4.25 × Sex.

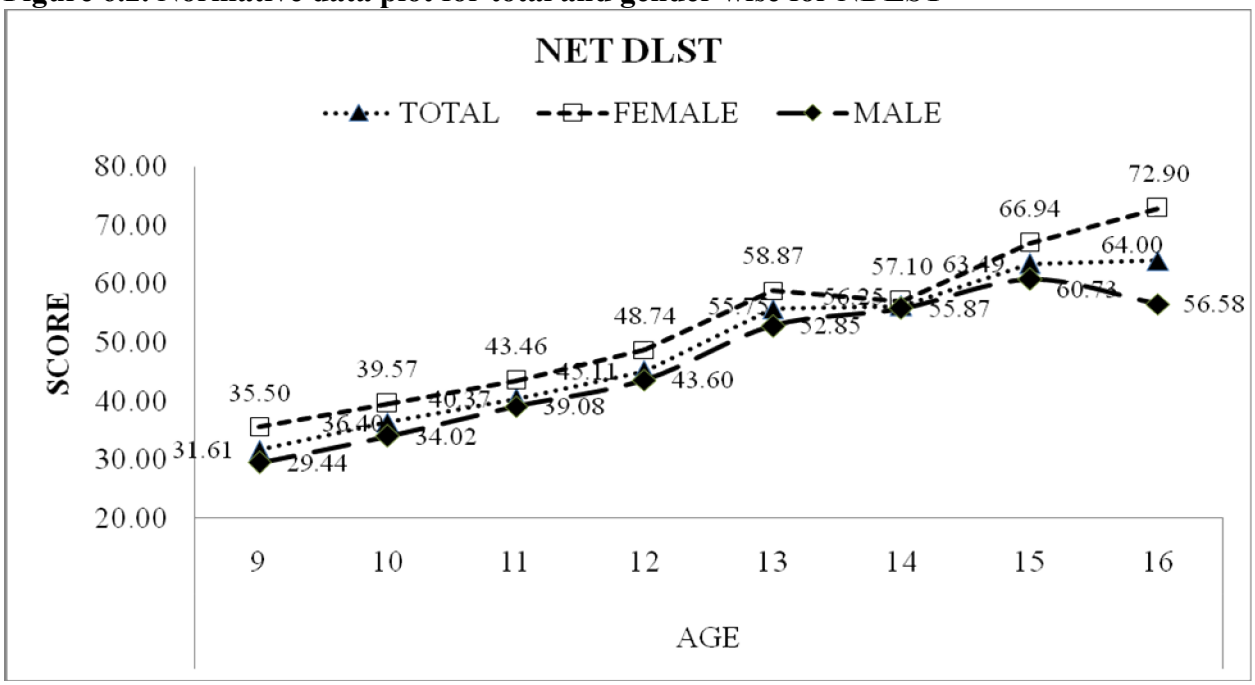
Figure 6.1. Normative data plot for total and gender wise for NSLCT



6.2 NORMATIVE DATA OF DLST

The model equation was: DLST score = –13.45+5.313×Age–5.647×Sex.

Figure 6.2. Normative data plot for total and gender wise for NDLST



6.3 EFFECT OF CM ON SLCT

Figure 6.3.1.A1: Total score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

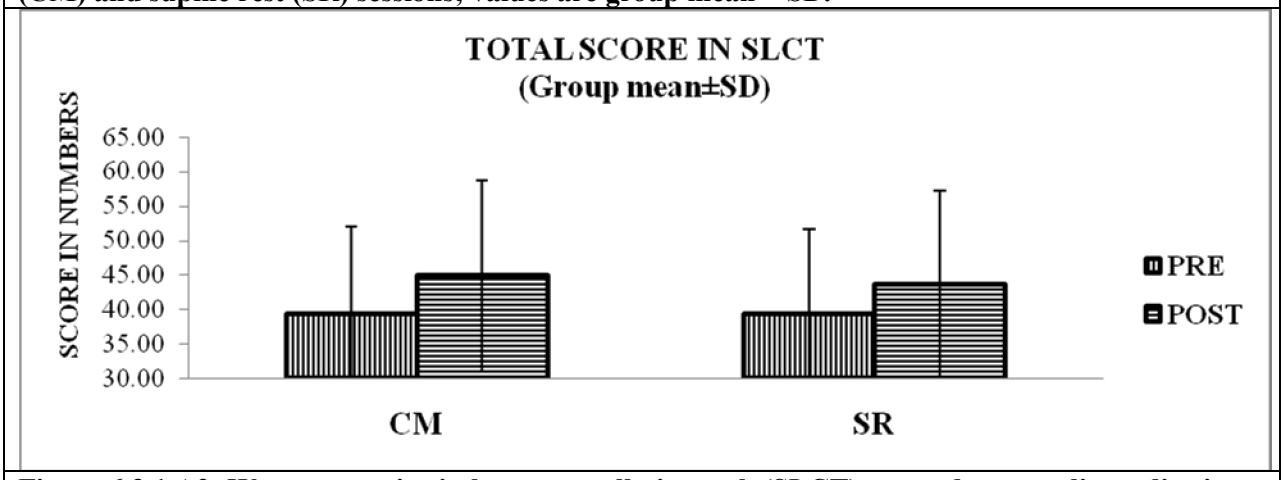


Figure 6.3.1.A2: Wrong score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

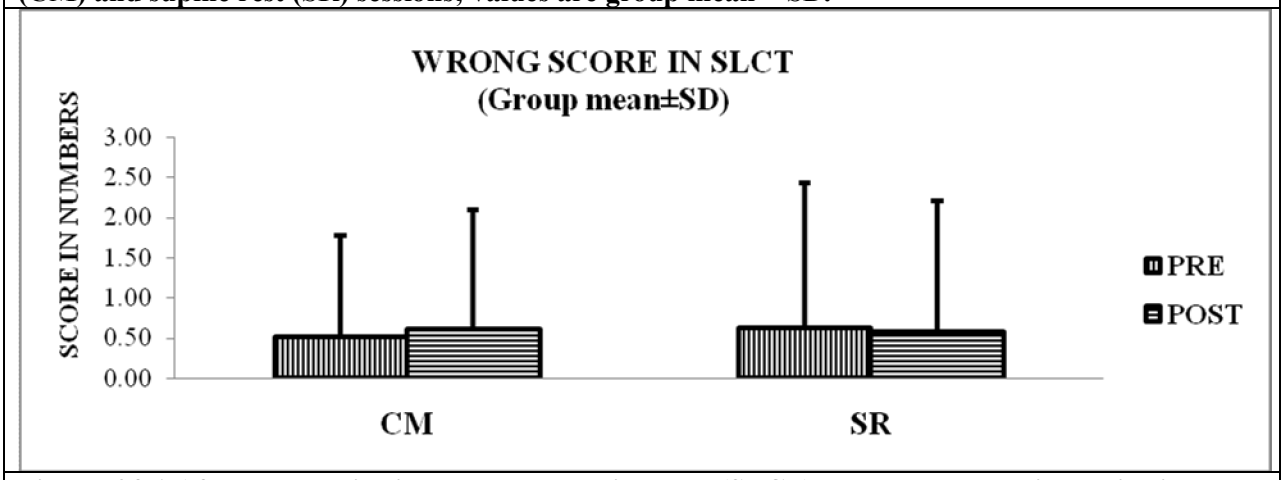


Figure 6.3.1.A3: Net score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

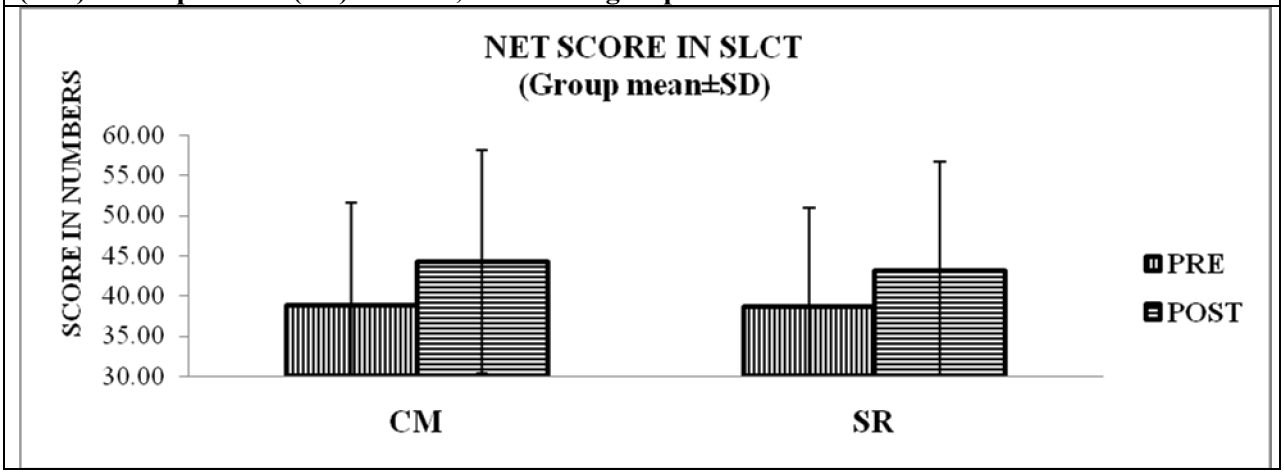


Figure 6.3.1.B1: Total score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

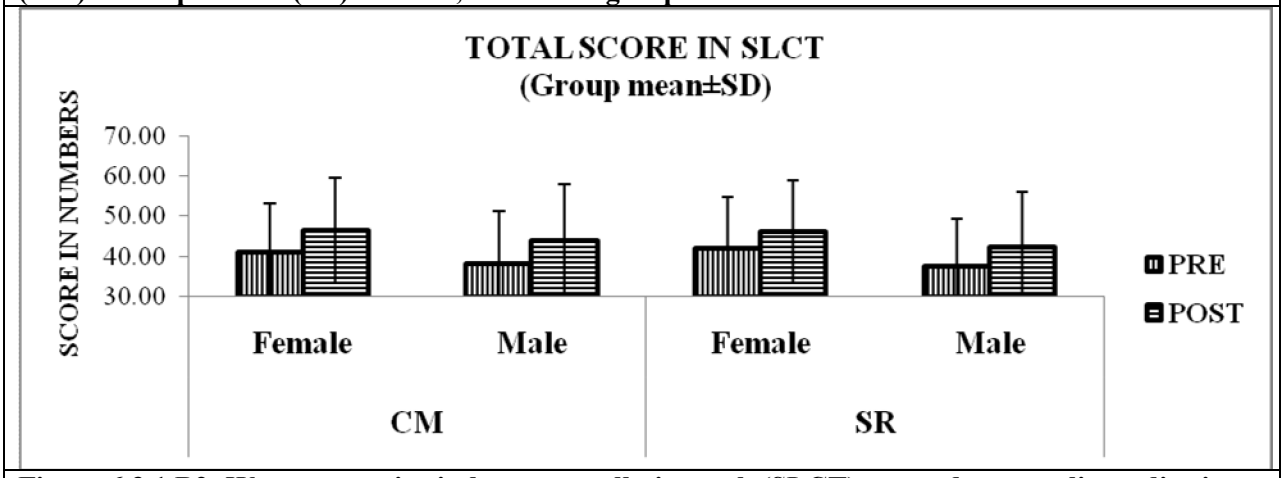


Figure 6.3.1.B2: Wrong score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

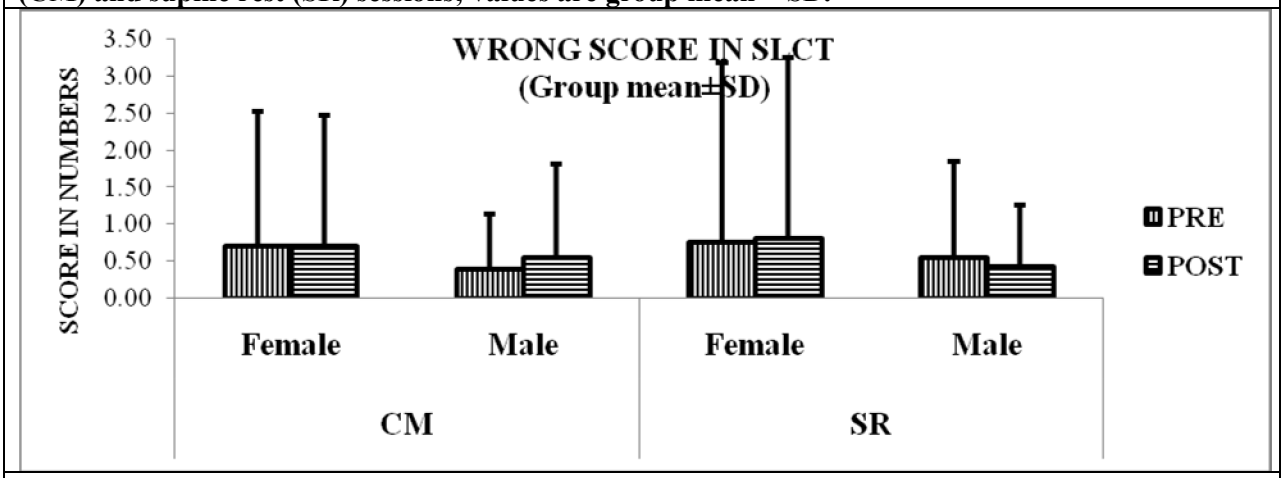


Figure 6.3.1.B3: Net score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

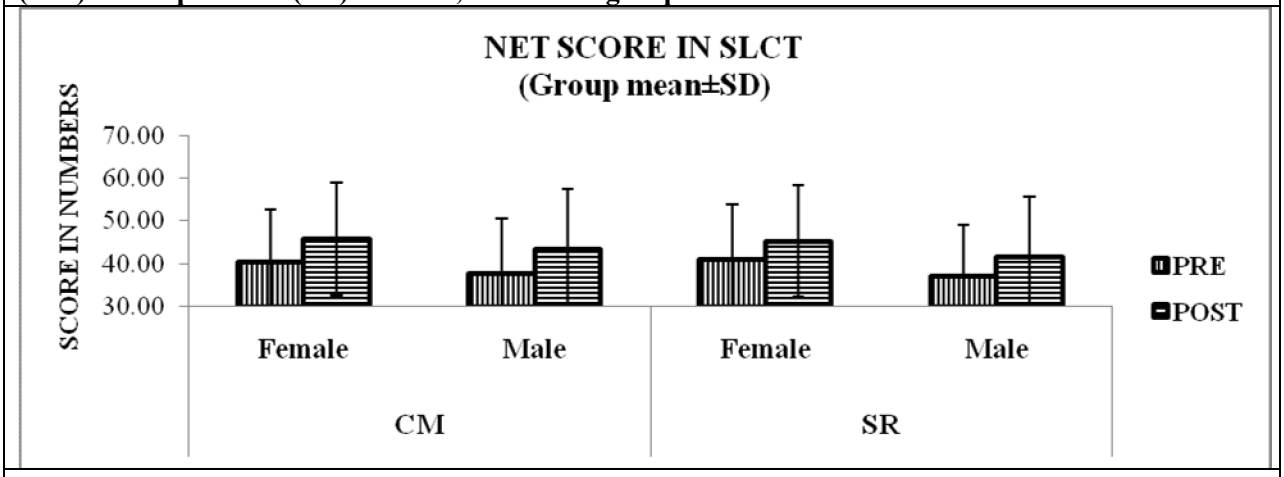


Figure 6.3.1.C1: Total score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

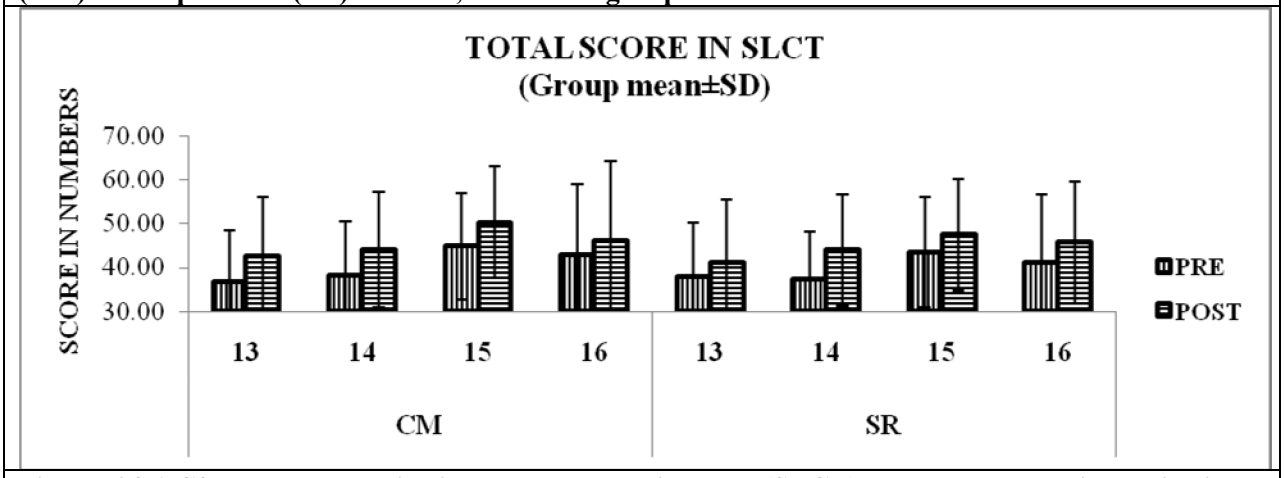


Figure 6.3.1.C2: Wrong score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

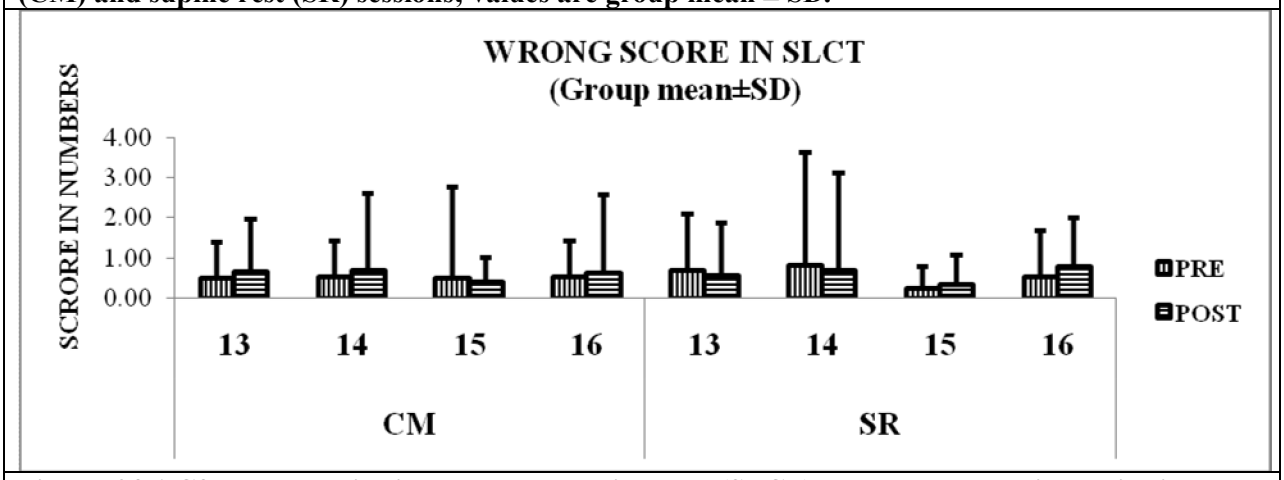
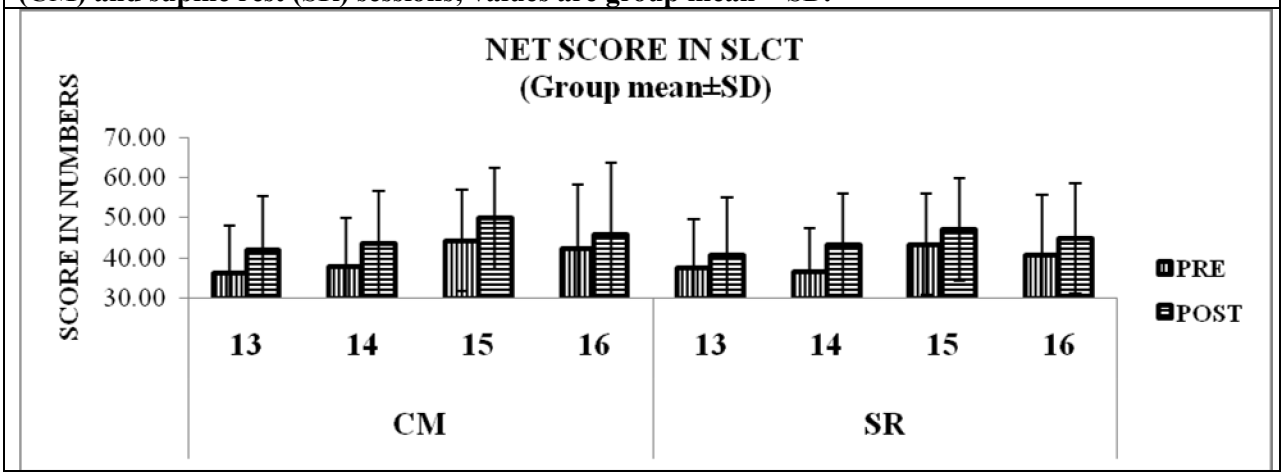


Figure 6.3.1.C3: Net score in six-letter cancellation task (SLCT) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.



6.4 EFFECT OF CM ON DLST

Figure 6.4.1.A1: Total score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

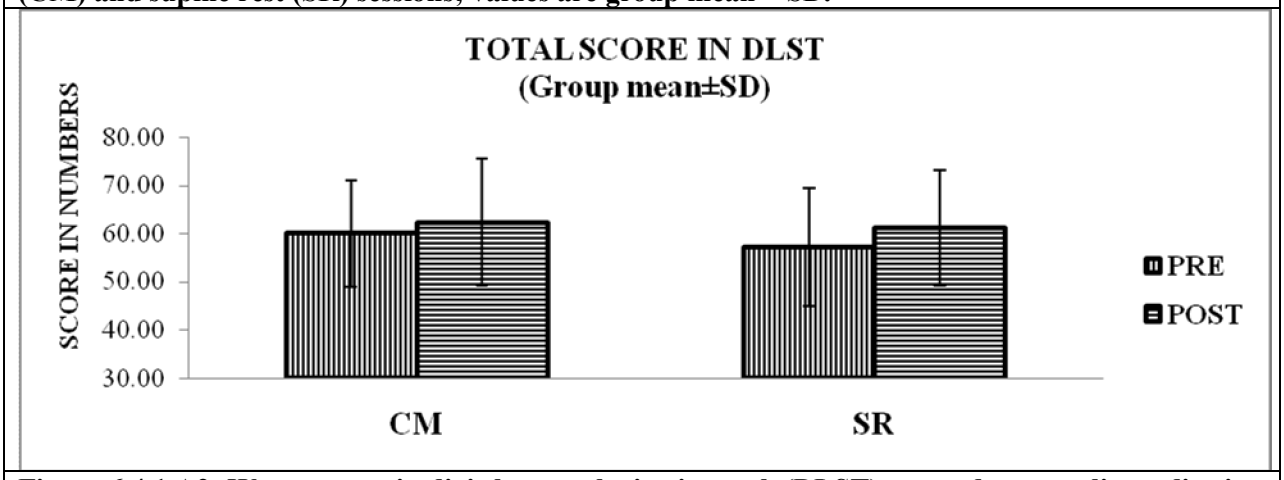


Figure 6.4.1.A2: Wrong score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

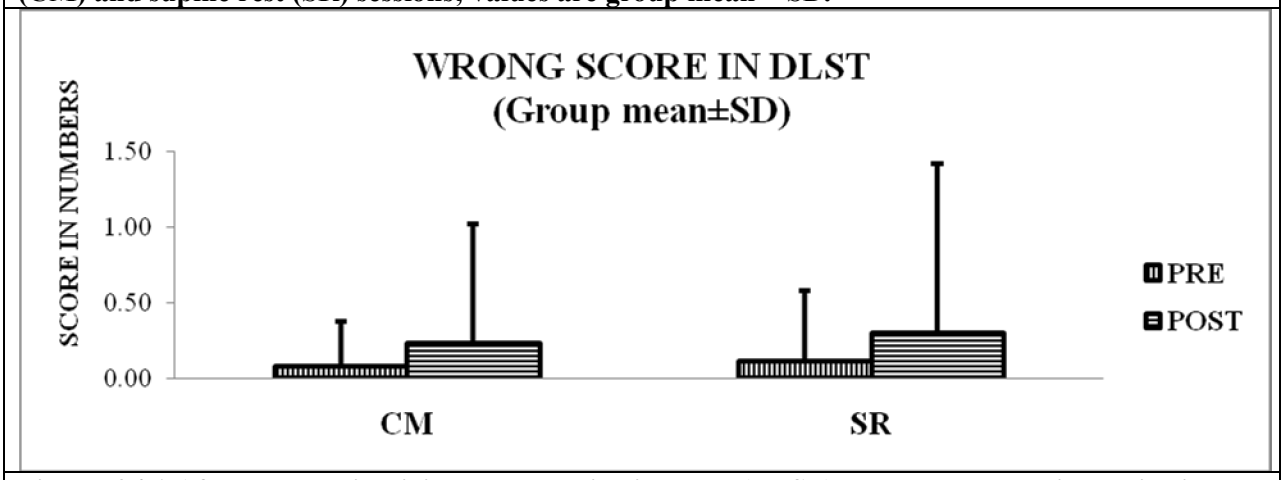


Figure 6.4.1.A3: Net score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

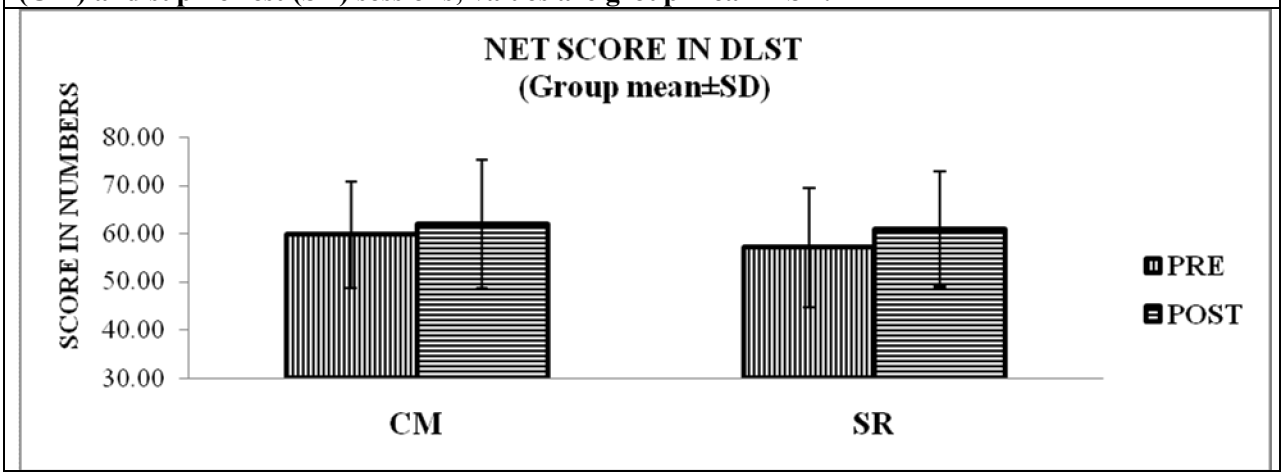


Figure 6.4.1.B1: Total score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

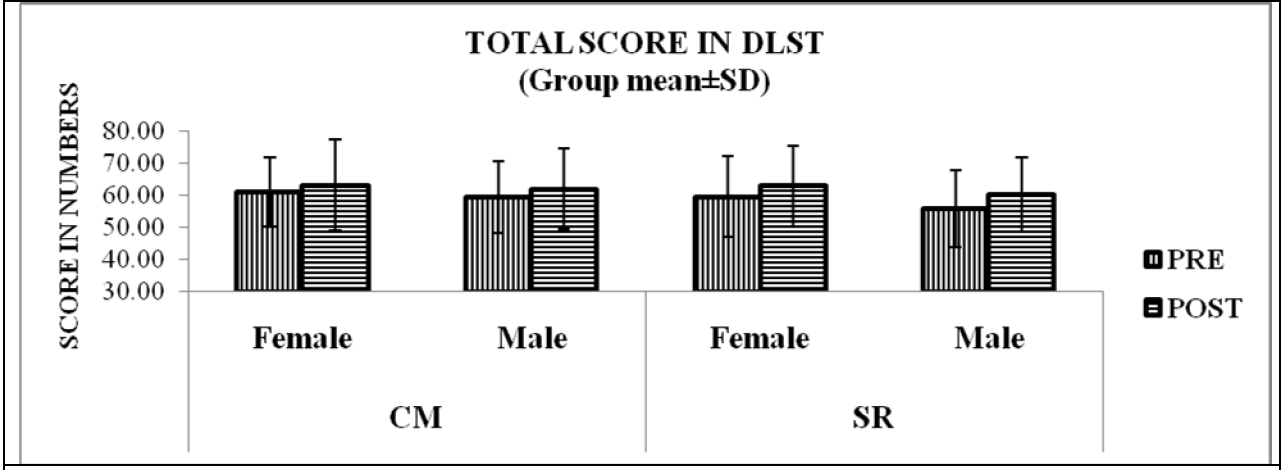


Figure 6.4.1.B2: Wrong score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

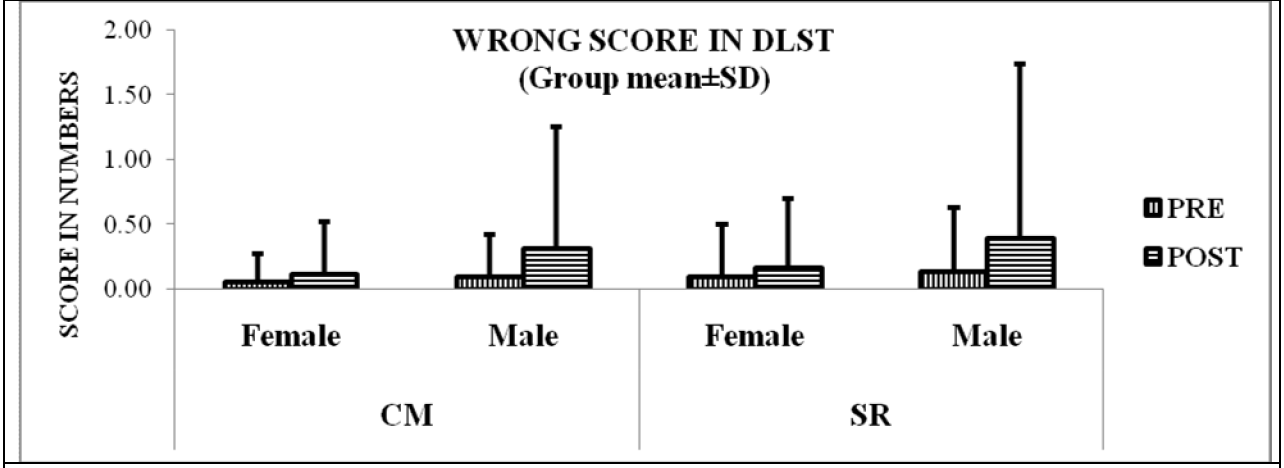


Figure 6.4.1.B3: Net score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

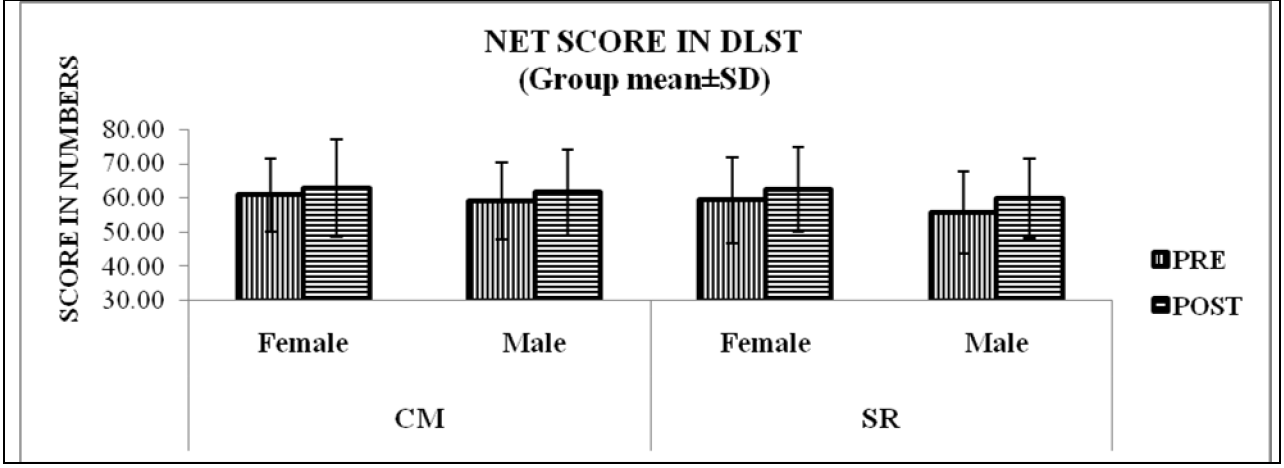


Figure 6.4.1.C1: Total score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

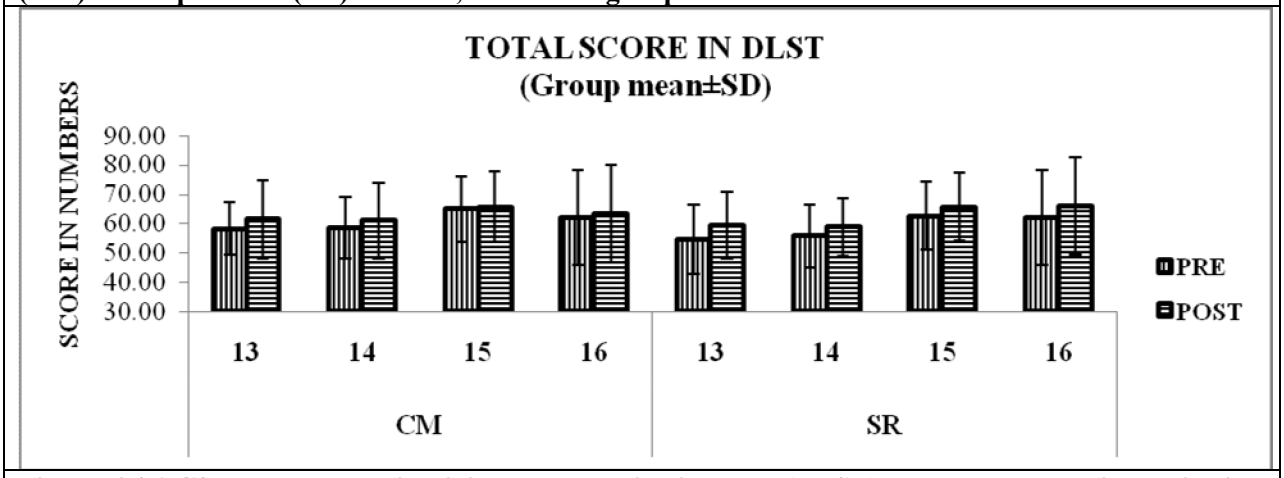


Figure 6.4.1.C2: Wrong score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.

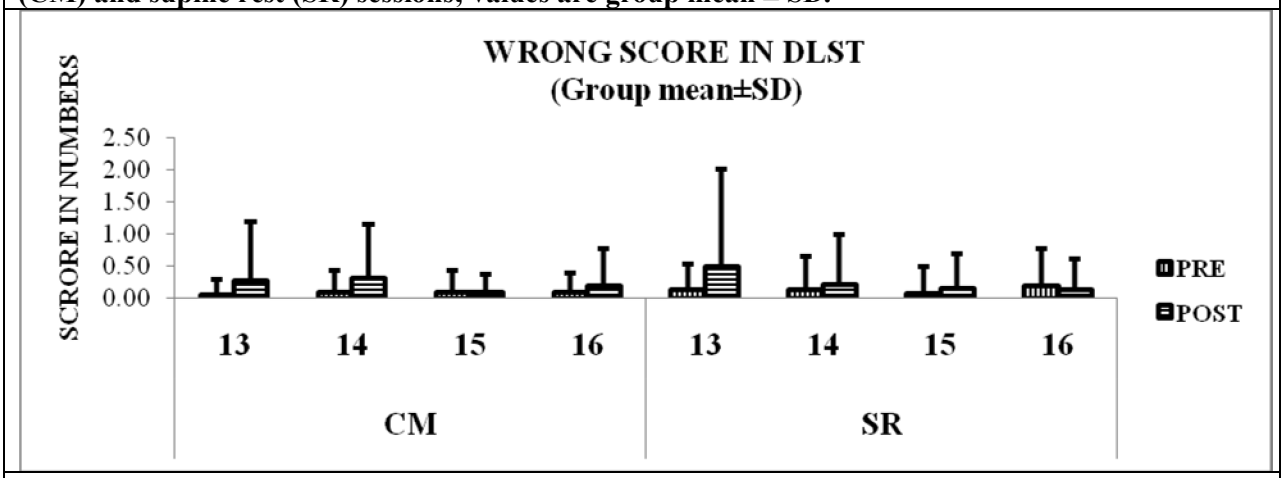
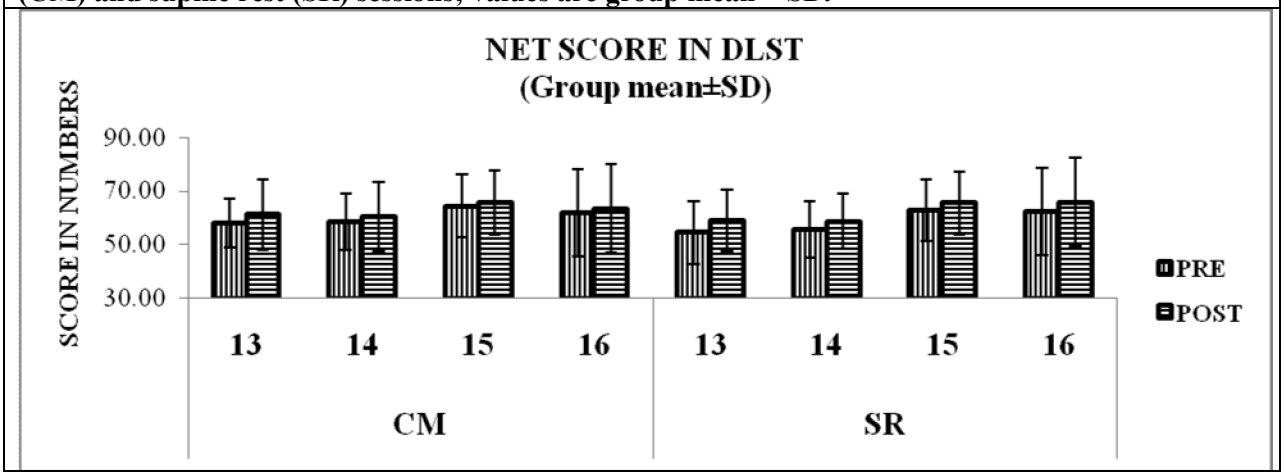


Figure 6.4.1.C3: Net score in digit-letter substitution task (DLST) pre and post cyclic meditation (CM) and supine rest (SR) sessions; values are group mean ± SD.



CHAPTER-7

Discussions

7.1	**NORMATIVE DATA OF SLCT**
7.2	**NORMATIVE DATA OF DLST**
7.3	**EFFECT OF CM AND SR ON SLCT**
7.4	**EFFECT OF CM AND SR ON DLST**

7.1. A NORMATIVE DATA OF SLCT

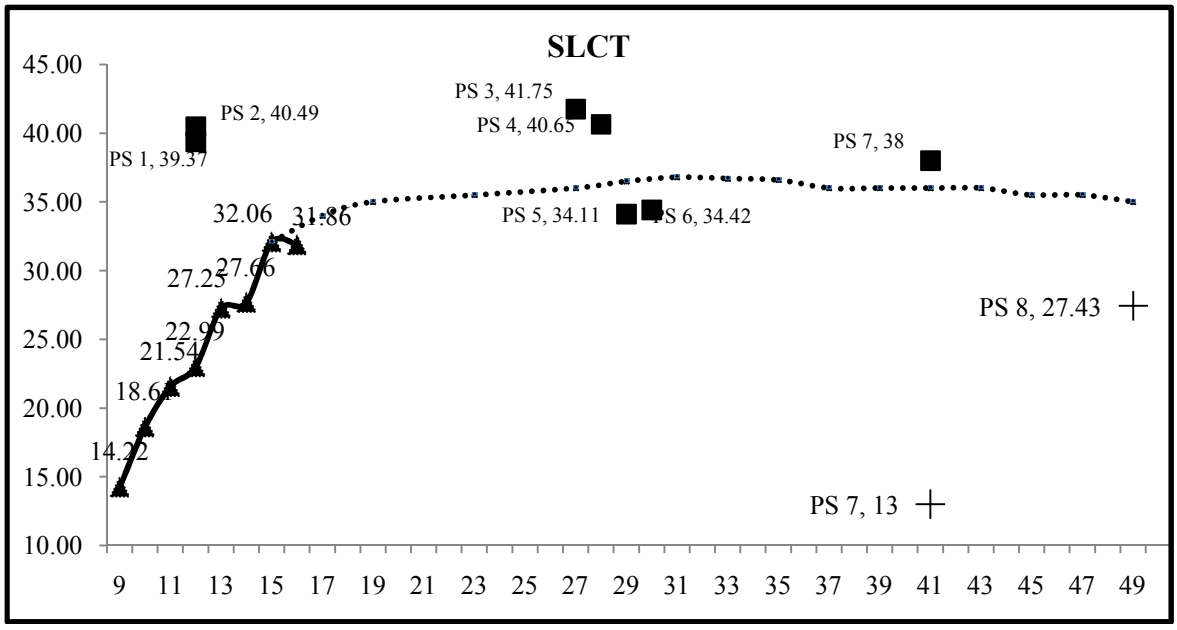
The results show an increase trend with age of both sexes (see Figure 6.1); females had higher scores than males. NSLCT results showed an increase of 14.22 to 31.86 (124%) in the age range from 9 to 16 years. The female showed an increase of 16.2 to 34.67 (113.99%) in the age range from 9 to 16 years while the male showed an increase of 13.06 to 29.75 (127.82%). The following Table summarises the data of earlier studies on SLCT. These results are shown depicted in Figure 7.1.1 below.

7.1.1 COMPARISON WITH EARLIER STUDIES

Table 7.1.1 Comparison with previous studies.

Sl.No.		PS = Previous Studies	Age Mean	Mean ±SD Normal population	Mean ±SD Patients population
1	PS 1	Rangan et al., 2009	12.5	39.37±2.49 for MES	----------
2	PS 2	Rangan et al., 2009	12.5	40.49±3.09 for GES	----------
3	PS 3	Sarang et al., 2007	27.4	41.75±6.71	----------
4	PS 4	Khemka et al., 2010	28	40.65±9.93	----------
5	PS 5	Sanjay et al.,2009	29.1	34.11±10.29	----------
6	PS 6	Khemka et al., 2009	30.14	34.42±9.9	----------
7	PS 7	Agarwal et.al., 2002	41	38±6	13±6
8	PS 8	Ritu et al., 2008	49.36	----------	27.43±6.91

Figure 7.1.1 Baseline comparison previous studies



Legend: ▲ Present study; ■ Previous Studies; + SLCT data on patients

In contrast Rangan et al., (2009) found much higher NSLCT scores compared to the scores of present study in the same age range. Following could be the reasons for the same.

A. As the students were from a residential set up, it may be possible that their concentration and attention were lot better than the students we have investigated in our study who essentially came from non-residential school set up.

B. In both the residential schools [Modern Education System (MES) and Gurukual Education System (GES) investigated by them, special attention was given for value education using modern approach and traditional Yoga based approach. This may be another reason for their high values. The Yogic approach in the Gurukula system showed even higher values than the MES school which shows that the students when trained in Yoga may have higher values of NSLCT.

C. The students were specially trained for total personality development in both schools laying emphasis on physical, mental, emotional and intellectual levels. This also might have contributed to the high scores of NSLCT.

The results of the other studies PS3 to PS7 (Table 7.1.1) have been marked in figure 7.1.1 for normal volunteers in the age range from 27 to 41. The dotted line in this figur shows contunuation of the increaseing ternd of NSLCT scores with dreaseing slope age becoming almost parallel to the X-axis showing saturation of growth with increased age factor.

The results of the PS7 and PS8 on patients show for lower scores than normal population suggesting a clear cognitive deficit in unhealthy population.

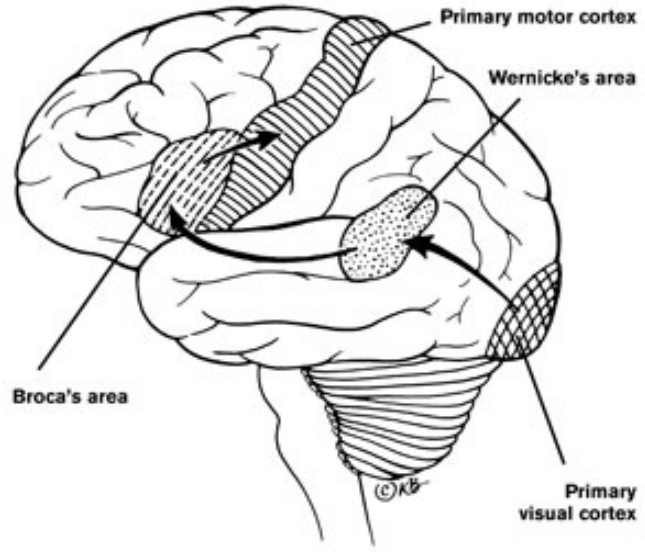
We now present the possible mechanism for this trend accoding to modern scientific understanding and ancient yogic perspectives.

7.1.2. **MECHANISM**

It is known that the posterior parietal cortex is important in normal eye movement control, visuo-spatial attention, and peripheral vision—all important components of reading (Stein

and Walsh, 1997).These attention tasks depend on functions of parietal cortex such as spatial attention task (Brannan and Williams, 1987) perceptual grouping (Williams and Bologna, 1985) and visual search (Casco and Prunetti, 1998). It is clear that many of these attention-related functions contribute to reading (Figure 7.1.2). Indeed, selective attention to a word or string of words requires concentrated focal attention and controlled shift of attention.

Figure 7.1.2: Schematic illustrating motor strip of cerebral cortex



In young age, it is well known that brain the brain functions develop fast while with increased age, it tapers off. This trend observed in our studyand previous studies (Figures 7.1.2).

7.1.3 YOGIC PERSPECTIVE

The entire human life has been divided into four stages according to yoga texts.

Ashram or stage	Age	Description
Brahmacharya (student life)	5-24	The student life spent in Gurukul where student must live with his Guru (teacher), to acquire knowledge of scriptures, practicing self-discipline and celibacy, philosophy, to live the *dhaārmic* way of life. This is the stage to gather and have continuous input of knowledge from noble sources with continous comprehensive growth.
Grihastha (household	25-49	The householder life is devoted to taking care of family, discharging performing the duties of family life as well as society, spent in

life)		enjoying family life in which one tries to implement the knowledge acquired from the previous stage of life (Brahmacharya). The society is actually supported by householders.
Vanaprastha (retired life)	50-74	In this phase of life one has to withdraw from worldly affairs and shares his wisdom with others at the same time making himself for the complete renunciation of for the sanyasa life. *Brahmacārīs* and Grihasthas are guided by Vanaprasthis on the wide experience of life.
Sanyāsa (renounced life)	75-100	The sanyasa life is for the fully devoted aspirants to seek moksha i.e. is fully withdraw from the world and practicing meditation. If the earlier three stages are followed properly, one voluntarily renounces everything (*Kāmya Karmas*). One stands as an ideal personality for entire society. It comes from the dedication not from the demand.

During *Brahmacarya* (5 to 20 years) there is acquisition of knowledge as students and in this growing age all faculties improve fast and an accelerated increase of concentration, sustained attention, memory and creativity are expected. These improvements go hand in hand with brain growth. Yoga practices tailor made for enhancing each of these powers (for example *dhāraṇā for* concentration, *dhyāna* for sustained attention, *Bhakti* yoga for creativity) can add dimensions to growth of students. An increase score of NSLCT in *Gurukula* system in which yoga practices were incorporated into the school curriculum As one enters the Grhasthashrama phase, the faculty development reduces as Substantiated by the trend of the curve in Figure 7.1.1 than a similar modern system of education (Rangan et. al., 2009) as an illustration of growth.

7.2 NORMATIVE DATA OF DLST

NDLST results showed an increase of 31.61 to 64.00 (102.49%) in the age range from 9 to 16 years. The girls showed an increase of 35.5 to 72.9 (105.35%) in the age range from 9 to 16 years, the boys showed an increase of 29.44 to 56.58 (92.17%) while he trend is same as NSLCT results.

7.2.1 COMPARISON WITH EARLIER STUDIES

The present study has finding similar to an earlier study wherein the Letter–Digit Substitution Test (LDST) was administered to cognitively screened sample of adults. Age was the most important predictor of LDST performance, and females outperformed males. The high level of education profoundly influenced LDST performance and high level of education had better performance than low level of education (Vander Elst, van Boxtel, van Breukelen and Jolles, 2006). The modified SDMT (M-SDMT) performance was influenced by race/ethnicity, age, education, and gender on the National Survey of

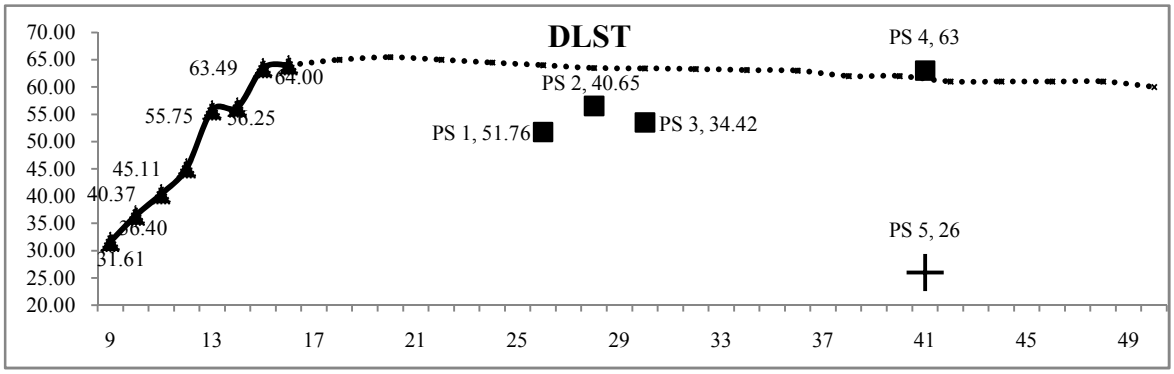
American Life. African–Americans and non-Latino Whites (NLW) groups had similar M-SDMT performances, which differed from Caribbean Blacks (Gonzalez, Whitfield, West, Williams, Lichtenberg and Jackson, 2007). In contrast, the variables across age, education, gender, and socioeconomic status had no impact on SDMT performance in a community of adults with neuropsychological impairment (Sheridan, Fitzgerald, Adams, Nigg, Martel, Puttler, et al. 2006). Hence it appears that this is a robust screening test for assessing neuropsychological impairment in adults.

The data from 5 previous studies shown in Table 7.2.1 are shown plotted in Figure 7.2.1 below.

Table 7.2.1 Comparison with previous studies on DLST

Sl. No		PS = Previous Studies	Age Mean	Normal population	Patients population
1	PS 1	Subramanya et al., 2009	26.5	51.76±9.21	
2	PS 2	Khemka et al., 2010	28	56.53±11.15	
3	PS 3	Khemka et al., 2009	30.14	53.53±14.75	
4	PS 4	Agarwal et.al., 2002	41	63±6	
4	PS 4	Agarwal et.al., 2002	41	--------	26±13

Figure 7.2.1 Shows baseline comparison with previous studies



Legend: **Legend**: ▲ Present study; ■ Previous Studies; + DLST data on patients

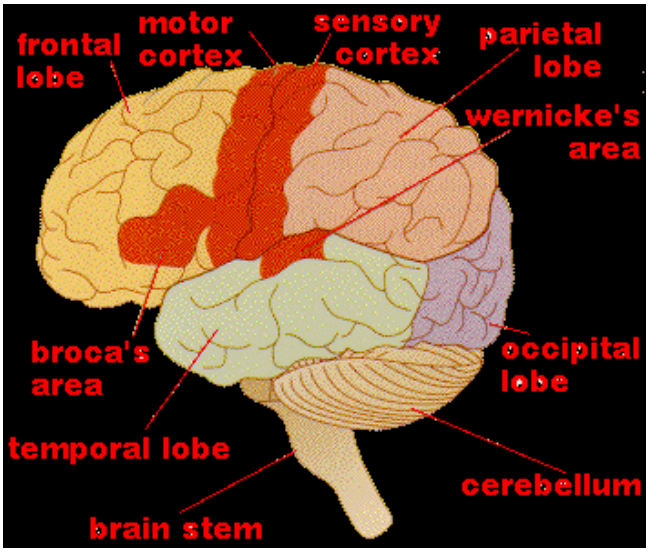
The baseline study of normal volunteers Agarwal et.al., (2002) found (DLST = 63±6; Age range = 41), Khemka et al., (2010) found (DLST = 40.65±9.93; mean age = 28), Khemka et al., (2009) found (DLST=34.42±9.9; mean age = 30.14), Subramanya et al., (2009) found (DLST=51.76±9.21; mean age = 26.5). The comparative baseline score were given in the Table 7.2.1 and shown depicted in Figure 7.2.1

A previous study Agarwal et.al., (2002) on 50 psychiatric inpatients (substance-related disorder, Schizophrenia, bipolar, depressive, or anxiety disorders) had documented that these patients had (NSLCT = 26±13; Age range = 41). The trend of the predicted curve (dotted line) appears to show stauturation much earlier than DLST scores.

However more data are needed to validate the predicted trend of lowering shlopes to saturation with age illutrated in Figure 7.2.1.

7.2.2. **MECHANISM**

The cortical areas related to cognitive aspects of Digit Symbol Test are identified using functional magnetic resonance imaging (fMRI). Executive brain functions involved in this test on the basis of fMRI results have revealed greater activations in a fronto-parietal cortical network, including the bilateral inferior frontal sulci, left middle frontal gyrus (close to the frontal eye field) and left posterior parietal cortex. These activations are interpreted as reflecting the visual search process and/or the updating process of working memory during the modified Digit Symbol Test execution. It found a positive correlation between the number of correct responses and activations in the bilateral inferior frontal regions, suggesting that these prefrontal areas have a crucial role in the performance of Digit Symbol Test in a healthy young adult population (Nobuo et. al., 2009).



It is known that the growth of these brain functions are faster in young age and almost stop with increased age (about 25).

7.2.3 YOGIC PERSPECTIVES

During the Brahmacarya (5 to 20) Yoga texts mention that the enhancement of the power of senses is marked. All *karmendriyas* (वाक् पाणिः पादः पायुः उपस्थम्), *jñānedriyas* (चक्षुः,नासिका, जिह्वा, त्वक्, श्रोत्र) and *antaḥkaraṇa* (मनः, बुद्धिः, चित्तं,अहंकारः) grow fast in the first phase of life.

Female system is featured by gentleness, tenderness and as they grow, teen age into the phase of puberty, big hormonal changes are set in the body which trigger corresponding changes in emotional dimensions in Manomaya kośa. These are related to visual aspect (रुप) of the mind and also are related to the right lobe of the brain. Hence, it can be expected that girls will have greater visually based abilities as also emotional intelligence. Probably, it is for this reason that girls have shown consistently greater scores than boys of same age.

Probably during this age the coordination between mind and body (sensory and motor organ) develop during the process of education especially when emphasis on total personality development is given using yoga techniques. Decrease of DLST scores with age is in time with the perspectives of yoga and spiritual lore.

7.3 EFFECT OF CM AND SR ON SLCT

The performance in the letter cancellation task improved immediately after the two yoga-based relaxation sessions, namely, CM and SR. However, the magnitude of change in the net scores after CM was 14.08% and after SR was 11.57%. There was no significant change in the wrong cancellation score after CM and SR.

7.3.1. COMPARISON WITH EARLIER STUDIES

The previous studies have shown the effect of yoga, relaxation and meditation in incresed NDLST scores i) Rangan et al., (2009) found (12% following 6 months of Gurukual Mode of Education; mean age = 12.5), Ritu et al., (2008) found (29% following 8 weeks of yoga programs), Khemka et al., (2010) found (24%, following one minute Kapalabhati interspersed with one minutes of rest mean age = 28), Khemka et al., (2009) found (25%, following 20 minutes of Deep Relaxation Techniques; mean age = 30.14), Sanjay et

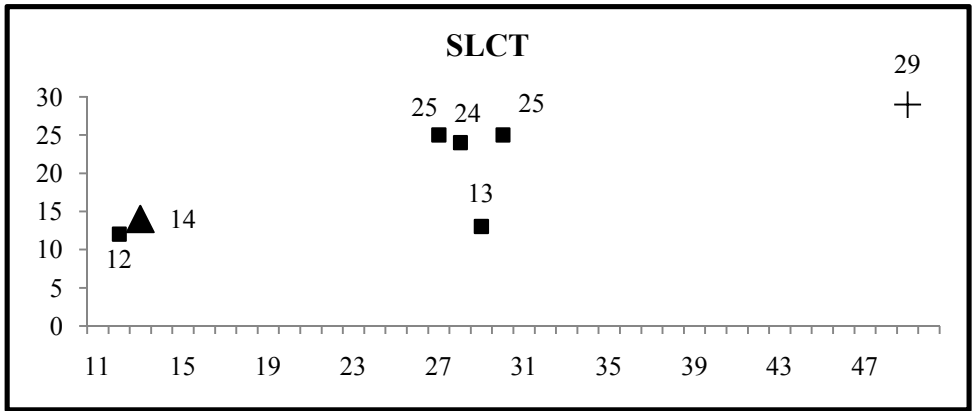
al.,(2009) found (Om Dharana = 13%, Om Dhyana = 5%; mean age = 29.1), Sarang et al., (2007) found (CM =25% and SR=13%; mean age = 27.4).

The data from 6 previous studies shown in Table 7.3.1 are shown plotted in Figure 7.3.1 below.

Table 7.3.1 Comparison with previous studies on NSLCT

Previous studies	Age mean	
1. Rangan et al., 2009	12.5	GES= 12%
2. Sarang et al., 2007	27.4	CM = 25%
3. Khemka et al., 2010	28	KB =24%
4. Sanjay et al.,2009	29.1	Dharana = 13%
5. Khemka et al., 2009	30.14	DRT = 25%
6. Ritu et al., 2008	49.36	Yoga = 29%

Figure 7.3.1 Comparison with previous studies



Legend: ▲ Present study; ■ Previous Studies; + DLST data on patients

The results of the other studies PS1 to PS6 (Table 7.3.1) have been marked in Figure 7.3.1 for effect of different tehniques of yoga in the age range from 12 to 49.36. It was observed from the Ploted Figure 7.31 graph shown that with increasing age the percentage of change score incresed.

In the present study, the change in the net score had a similar trend as in an earlier study that had an identical design in adults (Sarang and Telles, 2007). However, in the earlier study, there was a 24.9% improvement in the net score after CM and 11.6% after SR. This difference of change could be due to 1) Higher age range of the participants and 2) the subjects in the previous study had an average experience of 15.3±13.3 months, while in the present study the students had undergone only a seven-day training program. These

results suggest that the average duration of practice may have an influence on the outcome measures. For example, the progressive relaxation technique found slight differences in the first and second weeks, but major differences were observed in the fourth and fifth weeks in the 'Smith Relaxation State Inventory' before and after the session (Matsumoto and Smith, 2001).

7.3.2. MECHANISMS

Cancellation tasks involve sustained attention, concentration, visual scanning, and activation and inhibition of rapid responses (Lezak, Howieson and Loring, 2004). It is known that the yoga-based relaxation techniques bring enhancement in the performance task. Another study on patients with depression showed that, Sahaja Yoga Meditation can lead to additional improvement in executive functions, such as, manipulation of information in the verbal working memory, added improvement in the attention span, and visual-motor speed in (Sharma, Das, Mondal, Goswami and Gandhi, 2006).

Yoga practice has been understood to help in reducing anxiety, based on a reduction in the levels of psychophysiological arousal. In the earlier studies, both CM and SR, practiced for an equal period, found improvement in the metabolic cost, (Telles, Reddy and Nagendra, 2000; Sarang and Telles, 2006a; Sarang and Telles, 2007) autonomic function, (Sarang and Telles, 2006b) and attention measure, using P300 (Sarang and Telles, 2006c). Further study is required for an understanding of the mechanisms involved while forming the task and the effect of age and gender groups.

7.3.3. YOGA PERSPECTIVE

The word *dhāraṇā* is defined as '*desbandhah cittasya dhāraṇā*' [ability to fix the mind on one point in space] (PYS Ch-3.1).

Dhāraṇā is very often translated as concentration. In fact, it is very vague or not true translation. In general it is understood as ignorance of all except the chosen thought or object. Further it may be considered as a state of awareness or channelizing the thought process in a single direction avoiding distracted one. Cyclic meditation is repetition of cyclic order of *dhāraṇā* and *dhyāna* phase of yoga. Cyclic meditation has the component

of mental wakefulness, vigilance, concentration without getting disturbed by the distracted thought and reach to a state of mental equilibrium. This particular technique, where the practitioner trained himself by avoiding distracted thought (stress and tension) and holding on to the focused or attentive thought (Relaxation). The Six Letter Cancellation Task needs attention, concentration, vigilance and mental speed. Hence the improvements in this test account for cyclicity of *dhāraṇā* and *dhyāna*.

CM consists of stimulation-relaxation combine, stimulation to shatter *Tamas* (dullness, haphazardness) to develop concentration and relaxation to control *Rajas* (control the speed of mind develop sustained attention to bring autonomic balance). Probably the first dimension in the form of stimulation in CM has shown higher SLCT score compared to supine rest which did not have component of stimulation. All studies have clearly pointed to this enhanced concentration power as measured by SLCT, P300 and AEP etc.

7.4. EFFECT OF CM AND SR ON DLST

The DLST performance improved immediately after both types of yoga-based relaxation sessions. However, there were no significant differences between CM and SR. there were significant increase in wrong substitution scores after CM and SR.

7.4.1. COMPARISON WITH EARLIER STUDIES.

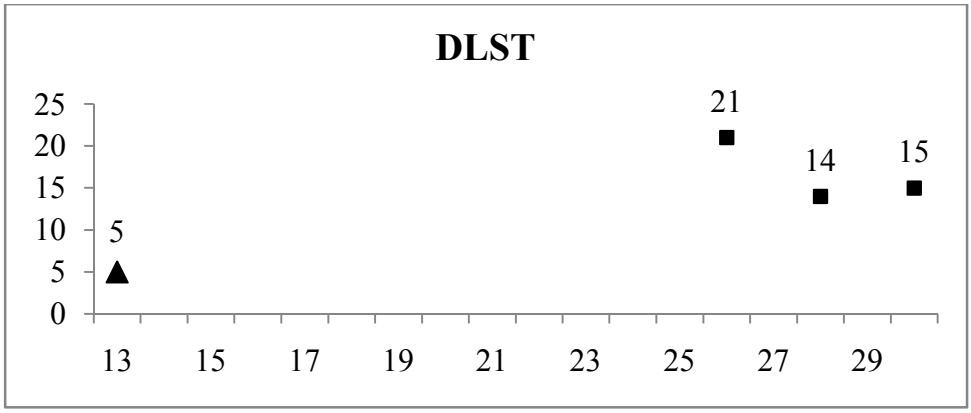
The previous immediate effect of yoga relaxation and meditation studies found the improvements in net scores i) Khemka et al., (2010) found (14%, following one minute Kapalabhati interspersed with one minute of rest of 10 round each, mean age = 28), Khemka et al., (2009) found (15%, following 20 minutes of Deep Relaxation techniques; mean age = 30.14), Subramanya et al., (2009) found (CM =21% and SR=3%; mean age = 27.4).

The data from 3 previous studies shown in Table 7.4.1 are shown plotted in Figure 7.4.1 below.

Table 7.4.1 Comparison with previous studies on DLST

Previous studies	Age mean	Percentage changes
1. Subramanya et al., 2009	26.5	CM = 21%
2. Khemka et al., 2010	28	KB = 14%
3. Khemka et al., 2009	30.14	DRT = 15%

Figure 7.4.1 Comparison with previous studies



Legend: ▲ Present study; ■ Previous Studies

In the earlier study there were greater improvements in CM compared to SR contrary to present study. One reason could be the difference in age. These studies included adult groups with well experienced yoga intervention. This difference of change could be due to the fact that the subjects in the previous study were well trained in the CM while in the present study the students had undergone only a seven-day training program. These results suggest that the average duration of practice may have an influence on the outcome measures. For example, the progressive relaxation technique found slight differences in the first and second weeks, but major differences were observed in the fourth and fifth weeks in the 'Smith Relaxation State Inventory' before and after the session (Matsumoto and Smith, 2001).

The DLST depends on different components of psychomotor performance from the SLCT, namely: (a) sensory information processing ability; (b) central integration of learning and memory, and (c) motor function and coordination (Agarwal, Kalra, Natu, Dadhich and Deswa, 2002). The DLST was developed from Digit Symbol Substitution Test (DSST), one of the subsets of the Wechsler intelligence scale (Wechsler D, 1981). Substitution tests are essentially speed-dependent tasks that require the subject to match particular signs - symbols, digits, or letters - to other signs within a specified time period. The DLST has the advantage of using letters and digits, signs that are already well-known to those taking the test. (van der Elst, van Boxtel, van Breukelen and Jolles, 2006). Thus, there is

no question of a need to learn new symbols while being tested. Such learning ability is definitely not one of the aptitudes on trial. For this reason, the DLST was used instead of the DSST (Natu and Agarwal, 2002). Substitution tasks involve visual scanning, mental flexibility, sustained attention, psychomotor speed, and speed of information processing. (Lezak, 1995; Van Hoof, Jogems-Kosterman, Sabbe, Zitman and Hulstijn, 1998). Our finding, that both CM and SR enhance task performance, suggests that one of more of these skills is being improved, probably sustained attention.

7.4.3. MECHANISMS

Previous results also show that CM practice reduces physiological arousal (decreases in oxygen consumption and minute ventilation are observed), (Telles, Reddy and Nagendra, 2000; Sarang and Telles, 2006), increases parasympathetic dominance, (Sarang and Telles, 2006) and decreases energy expenditure (Sarang and Telles, 2007). These changes occur together with decreased latency and increased amplitude in the P300 (Sarang and Telles, 2006). P300 event-related potentials (EPR) reflect fundamental cognitive events requiring attention and immediate memory processes (Polich, Ladish and Burns, 1990). They also reflect cognitive brain functions like sequential information processing, stimulus discrimination, and short-term memory (Kaga, Kodera, Hirota and Tsuzuku, 1991). Increases in EPR amplitude with attention suggest greater cognitive processing capacity (Sommer, Matt and Leuthold, 1990). Neuropsychological tests assessing how rapidly attentional resources are allocated for memory processing (Polich, Howard and Starr, 1983; Reinvang, 1999) associate shorter EPR latency with improved cognitive performance. Altogether, these results suggest that CM reduces physiological arousal, simultaneously improving performance on tasks requiring attention. Further studies are required to understand which mechanisms improve task performance. For example, anxiety is known to affect performance on tasks requiring attention (Fox, 1993). Anxiety reduction during CM and SR practice may have contributed in some way to the observed improvements in performance.

Substitution tasks involve visual scanning, mental flexibility, sustained attention, psychomotor speed, and speed of information processing (Lezak, 1995; Van Hoof, Jogems-Kosterman, Sabbe, Zitman and Hulstijn, 1998). CM has showed significant improvements on Visual scanning (Sarang et al. 2007), Memory measured through the component of whechelor scale the forward, backward digit span and associate memory (Subramayam et al., 2009), Sustained attention (Sarang and Telles, 2006), Psychomotor

speed measured through letter coping task (Subramayam et al., 2009), repetitive motor speed measure through dotting task (Subramayam et al., 2009). P300 an indication of information processing which found significant changes occur together with decreased latency and increased amplitude in the P300 (Sarang and Telles, 2006). All these putting together might be contributing to improvement in the DLST task performance.

The reason as to why the wrong scores had reduced in all earlier studies while they had increased in both CM & SR sessions in our study could be as follows:

1. While the enhanced total and net scores show an increased ability of sustained attention due to relaxation component of both relaxation techniques, an inability to keep alertness in relaxation or reduced alertness due to drowsiness might have been the reason.

2. It may be probably due to the randomness component of the mind also might have increased causing an increased wrong cancellation scores. However, the greater enhancement effect of relaxation might have compensated for the overall improvement in DLST scores.

7.4.4. YOGA PERSPECTIVE

The Digit Letter Substitution Task involves pairs of Digit Letter association. *Dhāraṇā* is very often translated as concentration where one needs to associate with the targeted thought keep it as long as possible by avoiding distracted one. Cyclic meditation is repetition of cyclic order of *dhāraṇā* and *dhyāna* phase of yoga. Cyclic meditation has the component of mental wakefulness, vigilance, concentration without getting disturbed by the distracted thought and reach to a state of mental equilibrium. This particular technique, where the practitioner trained himself by avoiding distracted thought (stress and tension) and holding on to the focused or attentive thought (Relaxation). The Digit Letter Substitution Task involves pairs of Digit Letter association. Hence the improvements in this test account for cyclicity of *dhāraṇā* and *dhyāna*.

CHAPTER-8

Summary conclusions and Apprisal

8.1 SUMMARY

Section 1: The present study was designed for establishing the normative data for (a) Six Letter Cancellation Task (b) Digit Letter Substitution Task.

Section 2: To study the effect of CM using (a) Six Letter Cancellation Task and (b) Digit Letter Substitution Task in comparison to control session with an equal period of SR, in school children.

Aim and objectives: The aim of study was to get Indian normative data on SLCT and DLST (SDMT) in children developed by Natu and Agrawal (1997) and use then as tools to assess the effect of cyclic meditation in normal healthy volunteers. Since the SLCT and DLST involves concentration and sustained attention. It was hypothesized that CM would increase performance on this task.

Assessments: Subjects were instructed to make their own choice of substitution/cancellation of letters strategy, whether horizontally, vertically, or selecting a particular digit/letter randomly in the array one at a time. They were told to substitute (digit) and cancelled (letter) as many target as possible in the specified time of 90 seconds in respective tasks (DLST and SLCT). These tasks were used in Indian population (Natu & Agrawal, 1997).

Subjects: The study consisted of 266 school students were participated with age range from 13 to 16 years.

Data extraction: For both tasks, total number of cancellation/substitution of letters attempted, and the number wrongly cancelled/substituted were counted. Then net score were obtained by deducting the wrong score from total score (Natu MV and Agarwal AK, 1997).

Data analysis: Statistical analysis was done using SPSS (Version 10.0) in the following steps:

Section 1: The normative procedure for NSLCT and NDLST are involved in the fitting of multiple linear regression models adjusted for age (in years) and sex.

Section 2: (i) Data were tested for variance and normal distribution by F-test and Kolmogorov-Smirnov test. (ii) For the normally distributed data, repeated measure analyses of variance (RMANOVA) were performed. (iii) post-hoc tests with Bonferroni adjustment.

Methods: For the first experiment (i) Normative data were established using one time assessment of task on school children (Male =528; Female = 315) with age range from 13 to 16 years group mean age ± S.D. (13.94±0.98). The second experiment, they participated in two sessions, i.e. CM and SR for a period of 22:30 min. Tasks were administered before and immediacy after each session.

Results: Section -1. Multiple linear regressions provided a multiple R value of 0.538 (SLCT) and 0.688 (DLST) with a corresponding R^2 determination index of 0.29 (SLCT) and 0.47 (DLST), indicating that 29% (SLCT) and 47% (DLST) of the score variance was explained by the combination of age and sex. The model equations were: (i) SLCT score = -4.307 + 2.545×Age – 4.25×Sex. (ii) DLST score = -13.45+ 5.313×Age – 5.647×Sex.

Section -2. Following both the sessions, there were no significant changes between the groups while significant improvement found in net and total score of SLCT and DLSTin both CM and SR as shown by the RMANOVA test.

8.2 CONCLUSION:

Section -1. The availability of the Indian normative data for the SLCT and DLST will allow wider application of this test in educational systems. CM was revealed to be good impact on psychomotor performance which will be useful for enhancing the student academic achievement.

Section 2. There were no significant changes between boys and girls. However, there was a significantly higher in CM compared to SR in total of SLCT. Hence Hypothesis is proven.

There was no significant change between CM and SR with respect to DLST and hence Null Hypothesis is proven.

There were no significant changes between sex and among ages for ALCT and DLST. Hence Null Hypothesis is proven.

8.3 STRENGTH OF THE STUDY

1. Large sample size
2. Inclusion of both boys and girls
3. Estalishment of normative data for SLCT and DLST for boys and girls from 9 to 16 years.

8.4 LIMITATIONS OF THE STUDY

1. Short duration of training program
2. Not multicentric Trial
3. Essentially english knowing children
4. Middle-higher economic urban status children

8.5 APPLICATIONS OF THE STUDY

1. These results permit quantitative evaluation of performance on the SLCT and DLST in healthy school children. As the SLCT and DLST are easy to administer in short duration of time and potentially useful in the assessment of attention, neglect, and psychomotor ability, it is hoped that these normative data will increase the use of SLCT and DLST in clinical pediatric populations.
2. To diagnose children with concentration and attention deficits in urban school set up.
3. Urban school to monitor the changes in concentration and attention of children.

8.6 SUGGESTIONS FOR FUTURE

1. Multicentric RCT can be done to expand the scope of these tests to rural setting as well as lower economic status as well.
2. Two armed and three armed randomized control studies should be planned with active and passive control groups for different populations such as children and teenager, adult, middle-aged, and geriatric-aged.
3. An additional active control group could be added receiving a combination simple asana and simple aerobic exercise.
4. Long term CM training could be given to children and examine the DLST changes.

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Appendices

	APPENDICES
A1	**Appendix- 1 : Detailed procedure of cyclic meditation**
A2	**Appendix- 2 : Copy of informed consent**
A3	**Appendix- 3 : Six letter cancellation task (SLCT)**
A4	**Appendix- 4 : Digit-letter substitution task (DLST)**
A5	**Appendix- 5 : List of tables of actual data**
	Publications from this doctoral thesis

Appendix -1

Technique of Cyclic Meditation

The complete description of the basic version of cyclic meditation (which was investigated in present study) is given below (Nagendra & Nagarathna, 2001). The key features of cyclic meditation are (i) postures interspersed with relaxation, (ii) slowness in movements, (iii) continuity, (iv) inner watchful awareness, (v) feeling of changes in breathing, heart beat, blood flow and the resonance of sound, and (vi) recognition of linear, surface, three-dimensional and all pervasive awareness. Through out the practice of cyclic meditation the participants are asked to keep their eyes closed.

1. **Prayer:** The practice of cyclic meditation begins by repeating a verse from the *Muṇḍūkya Upaniṣat*, while participants are laying in the supine posture. As participents chant the verse they are asked to feel the resonance throughout the body.

लये सम्बोधयेत् चित्तं विक्षिप्तं शमयेत् पुनः।
सकषायं विजानीयात् समप्राप्तं न चालयेत् ॥३.४४॥

Laye sambodhayet cittaṁ vikṣiptaṁ śamayet punaḥ,
Sakaṣāyaṁ vijñānīyāt samaprāptaṁ na cālayet.

'In a state of mental inactivity awaken the mind; when agitated, calm it; between these two states realize the possible abilities of the mind. If the mind has reached the state of perfect equilibrium then do not disturb it again'
(*Muṇḍūkya Upaniṣat Kārikā*: 3.44; Chinmayananda, 1984).

2. Instant Relaxation Technique (IRT): The prayer is followed by isometric contraction of the muscles of the body called Instant Relaxation Technique (IRT). The IRT is done in supine position with following instructions:

Bring legs together; join heels, toes together, palms byside of the thighs. Keep face smiling till the end. Gently bring your awareness to the tip of the toes. Streach the toes, tighten the anckle joints, and tighten the caff muscles. Pull up the kneecaps. Tighten the thigh muscles. Compress and squeeze the buttocks. Exhale and suck the abdomen inward. Make the fists of the palms and tighten the arms. Inhale and expand the chest. Tighten the shoulders, neck muscles and compress the face. Now tighten the whole body from the toes to the head. Tighten..tighten.

Relax and let go. Legs go apart; arms go apart, palms facing the roof. Asume the most comfortable position; let whole body sink down. Let all the groups of muscles completely relax. Collapse the whole body. Enjoy the relaxation.

3. *Tāḍāsana* (Tree posture): After IRT, the participents are asked to slowly raise the left hand above the head along the ground. Slowly turn over to left side in left latral position. Place the head on the left biceps; the right leg on the left leg; right palm on the right thigh. Let the whole body relax. Feel entire weight of the body along the left side of the trunk. Fine linear awareness. Then slowly start standing up to *tāḍāsana. Tāḍāsana* is the starting posture (sthiti) for all standing postures. In *tāḍāsana* the participents are asked to stand stright with feet, and legs close together, hands by side of the body along the thighs, fingers pointing dowanwards, shoulders collapsed and relaxed. Smiling face with eyes closed and normal breathing.

4. Centering in *Tāḍāsana:* While standing in *tāḍāsana* 'balancing' the body weight equally on both feet is called centering. While doing centering, participents are asked to gently lean forward without lifting the heels. Feel the entire body weight on the toes. Feel the pointed awareness. Come to center. Carefully lean backwards without lifiting the toes and feel the weight shifting towards the heels. Now come to center. Then slowly lean to the right, where feel the entire weight is on the right edge of the right foot. Fine linear awareness. Then come to center. Similarly lean to left, and come to center. Now feel the body weight is being

equally distributed on the soles of the both the feet. Fine surface awareness. The whole body is centered and well-balanced.

5. ***Ardhakaṭicakrāsana*** **(Half wheel posture):** From *tāḍāsana,* very slowly raise the right arm sideways upward to horizontal position. As the right arm reaches 90 degree position twist the palm at wrist upward, feel the pointed awareness at wrist, and then raise the right arm further up to 135 degree position. As right arm reaches up the vertical position feel the nice stimulation in the right shoulder muscles. The right biceps muscle touching the right ear, feel the nice surface awareness. Feel the blood flowing down the arm with smiling face. Then streach the right hand from the tip of the fingers of the right palm. Entire right portion of the body gets stretched, but not the face. Slowly start bending down laterally to the left side. Left palm sliding down along the left thigh. Fine movement of surface awareness. Enjoy the the fine stretch of the waist muscles on the right side and compression on the left side. Observe all the changes taking place in your body. Slowly start coming back to vertical postion. Feel the blood flowing down and spread of nerve impulses throughout the body. Again stretch and pull up the right arm. Feel the entire right portion of the body stretched from toes to the tip of the fingers. Slowly start brining the right arm down to 135 degree gliding down smothly. Feel the pointed awareness at the shoulder as arm reaches the horizontal position and at the wrist as you slowly turn the right palm downward. Further bring down the arm to 45 degree. Feel the tingling sensation at the tips of the fingers. Contineously glide down the hand by the side of the right thigh and leave it freely. Have a galnce of the whole body from toes to head and feel entire right side of the body being activated and charged.

Similary, *ardhakaṭicakrāsana* is performed from left side. Very slowly raise the left arm sideways upward to horizontal position. As the left arm reaches 90 degree position twist the palm

at wrist upward, feel the pointed awareness at wrist, and then raise the left arm further up to 135 degree position. As left arm reaches up the vertical position feel the nice stimulation in the left shoulder muscles. The left biceps muscle touching the left ear, feel the nice surface awareness. Feel the blood flowing down the arm. Then strech the left hand from the tip of the fingers of the left palm. Entire left portion of the body gets streatched, but not the face. Slowly start bending down laterally to the right side. Right palm sliding down along the right thigh. Fine movement of surface awareness. Enjoy the the fine stretch of the waist muscles on the left side and compression on the right side. Observe all the changes taking place in your body. Slowly start coming back to vertical postion. Feel the blood flowing down and spread of nerve impulses throughout the body. Again stretch and pull up the left arm. Feel the entire left portion of the body stretched from toes to the tip of the fingers. Slowly start brining the left arm down to 135 degree gliding down smothly. Feel the pointed awareness at the shoulder as arm reaches the horizontal position and at the wrist as you slowly turn the left palm downward. Further bring down the arm to 45 degree. Feel the tingling sensation at the tips of the fingers. Contineously glide down the hand by the side of the left thigh and leave it freely. Collapse your both shoulders and come back to *tāḍāsana*. Have galnce of whole body again frm toes to head. Entire left portion of the body is now activated. Feel both the sides of the body are now equally energized. Relax and get balanced in *tāḍāsana.*

6. *Pādahastāsana* (Forward bending posture): After resting in *tāḍāsana,* the forward bending posture called *Pādahastāsana* is performed. Very slowly start bending forward from the waist, keeping both the hands free from shoulders. While bending forward feel the blood gushing towards head and neck region. Bend forward as much as possible. Feel the stretching in the back and the dorsal aspect of the buttocks and the knees. Feel the compression in the abdomen. Maintain the final posture effortlessly with smiling face. Obsreve all the changes going on, the increased blood flow to head and feel the heavyness in the head region. Inhale and chant M-kara, MMM… Feel the resonance throughout the head with a nice three dimentional awareness. Gently start coming up

from the final posture. While observing the changes in blood flow, breathing and heart beat from horizontal plane slowly come back in *tāḍāsana* and relax. Feel the lightness in the head and entire dorsal portion of the body being activated.

7. ***Ardhacakrāsana*** **(Backward bending posture):** From *tāḍāsana* slowly slide the palms up along the thighs, supporting the waist with the palms, fingers together and pointing forwards. Slowly start bending backwards from the waist. Relax the neck muscles; head hanging freely down. Nice stretching of the abdominal and thoracic muscles. In final posture have a smile on the face. Inhale and chant A-kara AAA…and feel the resonance with three dimentional awareness. Slowly return back in stright position, gently sliding the palms back to their original position in *tāḍāsana*. Feel the entire front portion of the body being activated and energized.

8. Deep Relaxation Technique (DRT): From *tāḍāsana* gently come in sitting position and slowly slide down in supine position with support of elbows. Lay down in *śavāsana* with legs apart, hands part, palms facing the roof and whole body collapsed on the ground.

Bring your awareness to the tip of the toes, gently move your toes and relax. Sensitize the soles of your feet; loosen the ankle joints; relax the calf muscles; gently pull up the kneecaps, release and relax; relax your thigh muscles, buttocks; loosen the hip joints, relax the pelvic region and the waist region. Totally relax your lower part of the body. Relax and chant A-kara AAA and feel the vibrations in the lower parts of the body.

Gently bring your awareness to the abdominal region and observe the abdominal movements for a while, relax your abdominal muscles and relax your chest muscles.

Gently bring your awareness to your lower back, relax your lower back, and loosen all the vertebral joints one by one. Relax the muscles and nerves around the backbones. Relax your middle back, shoulder blades and upper back muscles, totally relax. Shift your awareness to tip of fingers, gently move them a little and sensitize. Relax your fingers one by one. Relax your palms, loosen the wrist joints, relax the forearms, loosen the elbow joints, relax the biceps and triceps and relax your shoulders. Shift your awareness to your neck, slowly turn your head to right and left, and again bring back to center. Relax the muscles and nerves of the neck. Relax your middle part of the body, totally relax. Relax and chant U-kara UUU… and feel the vibrations in the middle parts of the body.

Gently bring your awareness to your head region. Relax your chin, lower jaw and upper jaw, lower and upper gums, lower and upper teeth and relax your tongue. Relax your throat and vocal cords. Relax your both the lips, obseve your nostrils. Feel the touch of air in your nostrils. Observe your breathing for few seconds and relax your nostrils. Relax your cheek muscles, have a beautiful smile on your cheeks. Relax your eye lids, eye ball, eye brows and region between your eye brows. Relax your forehead, temple muscles, ears, sides of the head, back of the head and the crown of the head. Totally relax your entire head region. Relax and chant M-kara MMM… and feel the vibrations in the head and face region.

Observe your whole body from toes to head and relax. Relax and collapse your whole body on the ground. Relax and chant OM-kara AUM… and feel the vibrations and resonance throughout the body.

Slowly come out of the body consciousness. Bring your awareness out of your body and visualize your body laying on the ground completely collapsed. And gently take your awareness towrds beautiful sky. Imagine the vast beautiful blue sky. The limitless blue sky. Expand your awareness as vast as the blue sky. Merge yourself into the blue sky. Enjoy the infinate bliss. Enjoy the blissful state of silence and all pervasive awareness.

Gently come back to body consciousness. Feel the lightnees, alertness and movement of energy throughout your body. Slowly bring your legs together, hands by

side of the body. Slowly turn to right side of the body and come up when you feel for closing prayer.

9. Closing Prayer:

सर्वे भवन्तु सुखिनः सर्वे सन्तु निरामयाः ।

सर्वे भद्राणि पश्यन्तु मा कश्चिद् दुःख भाग्भवेत ॥

sarve bhavantu sukhinaḥ sarve santu nirāmayāḥ.
sarve bhadrāṇi paśyantu mā kaścid duḥkha bhāgbhaveta.
Let every body be happy, let every body be healthy, let every body be able to see the auspicious truth, let no one suffer from any illness or pain.

Appendix-2

INFORMED CONSENT FORM

Title of the project : Effects of cyclic meditation in psychomotor performance on children

Investigator : Balaram Pradhan, M.Sc., Regd. Ph.D. candidate

Name of the guides **:** H.R. NAGENDRA **M.E., Ph.D.**
: R NAGARARATHAN **MD, FRCP (Edin.)**

Name of the Participant : _____

Date and Time : _____and _____

About the Project:

In order to understand the psychomotor function and attention response before and after the practice of cyclic meditation we will be recording cognitive performance task using individual paper pencil test i) Six Letter Cancellation Test ii) Digit Letter Substitution Test.

All these techniques are noninvasive and commonly used in routine clinical practice.

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 participant**

Appendix-3

SIX LETTER CANCELLATION TEST

Instructions:

1. Search out the target letters 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 : **J, T, K, M, U, F**

J G Y L S E T B L U V G K H A W U J M K R B

X N O D F C K N E H W Z L J S D Q L N H U O

U K W A I M P G Q X M F Y B I R X G F P J K

Z V B H J S Y D K O S Q T M P O E I A T L E

T L Y R O Z L F A U I N Z G W T J K D R Y A

D S Q C E T R W Z J A E H L U Y V Z S O N X

E W K F H M N C P X R O K I C R F G P I K S

G U A P S V I O B D C S F X E H W Q M L O R

H T Y G D L U Q G Y W A B Z D Y V U A E Q P

L V O E J Z F T L E M H Q J A X R D B Z N J

S W N Q K H C A Z N O I S M L E J S H G T F

A P F X O R I J B D P K W I J K O R I B Z A

R T Y B V D X S U F R X O Q B T B X W D S Z

M I G U W K O C E N V T H Z M N C U Y P K E

Total attempted: Wrongly attempted: Net score:

SIX LETTER CANCELLATION TEST (A)

Instructions:

4. Search out the target letters given below and cancel them by slash (/).
5. Cancel as many as possible within the given time.
6. Start and stop only when told.

Target Letters : **J, T, K, M, U, F**

E U B R Q B D J W Q A Z Q M L Q J R R Y I D

G S T R K J J B U R K I X U M B U N P F S G

I E H N Y R E J O X L Z Q S I K F R N Q P N

K H M X T L S P O R O G L P S I C I C Y Q E

L Q T A R X W O W W D U E O E J K E V V B C

S Y R K S T C E N G S H B E L P K H Z I L I

Z P J W D H J W W T Z N S H H F M G A Z A P

G H O X W B I Q K C J A V T M N Q M N Z O U

S F K F A G E S M V U F J R C Z F K Y X I I

Y N O O W A G K T G A B X P L D W O G L O L

A G K Y L B C X T H X Y M M X O R Z F L K T

K T E B V L H H N R S F W A O W D E X Q D Z

D E Q U I D S N E P Y D M D J Y J V Q F V Y

A K T D J F P H B S O Z O X A V Z A T U B C

Total attempted: Wrongly attempted: Net score:

Appendix-4

DIGIT LETTER SUBSTITUTION TEST

Instructions:

1. Substitute the digits with corresponding letter as per the given key.
2. Substitute as many possible within the given time.
3. Start and stop only when told.

Substitue Lettres:

1	2	3	4	5	6	7	8	9
L	H	Y	N	R	E	D	T	J

6	2	4	1	5	7	9	3	2	6	8	5

5	4	7	8	1	2	3	4	9	6	3	7

2	4	6	7	8	9	3	1	2	3	7	4

2	9	4	6	8	1	2	5	9	3	4	7

9	7	4	2	3	8	1	5	6	2	9	1

8	6	2	3	9	4	5	7	1	4	3	9

3	5	9	1	2	5	6	2	7	8	9	1

5	4	9	2	7	1	3	2	8	9	5	6

Total attempted: Wrongly attempted: Net score:

DIGIT LETTER SUBSTITUTION TEST

Instructions:

1. Substitute the digits with corresponding letter as per the given key.
2. Substitute as many possible within the given time.
3. Start and stop only when told.

Substitue Lettres:

1	2	3	4	5	6	7	8	9
J	Y	N	H	R	T	D	E	L

6	2	4	1	5	7	9	3	2	6	8	5

5	4	7	8	1	2	3	4	9	6	3	7

2	4	6	7	8	9	3	1	2	3	7	4

2	9	4	6	8	1	2	5	9	3	4	7

9	7	4	2	3	8	1	5	6	2	9	1

8	6	2	3	9	4	5	7	1	4	3	9

3	5	9	1	2	5	6	2	7	8	9	1

5	4	9	2	7	1	3	2	8	9	5	6

Total attempted: Wrongly attempted: Net score:

Table 5.2.1.A: Total score, score for wrong cancellation, and net score of six letter cancellation test for normative scores.

SLCODE	AGE	SEX	Total Score	Wrong Score	Net Score
NORM SLCT1	9	0	25	1	24
NORM SLCT2	9	0	25	0	25
NORM SLCT3	9	0	23	0	23
NORM SLCT4	9	1	21	0	21
NORM SLCT5	9	1	21	0	21
NORM SLCT6	9	1	21	0	21
NORM SLCT7	9	1	19	0	19
NORM SLCT8	9	0	18	1	17
NORM SLCT9	9	0	16	0	16
NORM SLCT10	9	0	16	0	16
NORM SLCT11	9	1	15	1	14
NORM SLCT12	9	1	15	0	15
NORM SLCT13	9	1	14	1	13
NORM SLCT14	9	1	14	0	14
NORM SLCT15	9	1	13	0	13
NORM SLCT16	9	1	13	0	13
NORM SLCT17	9	0	12	0	12
NORM SLCT18	9	0	12	0	12
NORM SLCT19	9	0	12	0	12
NORM SLCT20	9	1	11	0	11
NORM SLCT21	9	1	10	0	10
NORM SLCT22	9	1	9	2	7
NORM SLCT23	9	1	8	0	8
NORM SLCT24	9	1	8	1	7
NORM SLCT25	9	1	8	1	7
NORM SLCT26	9	1	8	0	8
NORM SLCT27	9	0	7	2	5
NORM SLCT28	10	0	36	0	36
NORM SLCT29	10	0	36	0	36
NORM SLCT30	10	0	33	0	33
NORM SLCT31	10	1	33	0	33
NORM SLCT32	10	1	32	1	31
NORM SLCT33	10	0	31	1	30

NORM SLCT34	10	0	31	0	31
NORM SLCT35	10	0	31	0	31
NORM SLCT36	10	0	30	0	30
NORM SLCT37	10	0	30	2	28
NORM SLCT38	10	0	30	0	30
NORM SLCT39	10	0	30	0	30
NORM SLCT40	10	0	30	0	30
NORM SLCT41	10	0	29	0	29
NORM SLCT42	10	1	29	0	29
NORM SLCT43	10	0	28	0	28
NORM SLCT44	10	1	28	.	28
NORM SLCT45	10	1	28	0	28
NORM SLCT46	10	0	27	0	27
NORM SLCT47	10	0	27	0	27
NORM SLCT48	10	0	27	0	27
NORM SLCT49	10	0	27	0	27
NORM SLCT50	10	0	27	0	27
NORM SLCT51	10	1	27	0	27
NORM SLCT52	10	1	27	1	26
NORM SLCT53	10	1	27	0	27
NORM SLCT54	10	0	26	0	26
NORM SLCT55	10	0	26	0	26
NORM SLCT56	10	0	26	0	26
NORM SLCT57	10	1	26	2	24
NORM SLCT58	10	1	26	4	22
NORM SLCT59	10	1	26	7	19
NORM SLCT60	10	1	26	0	26
NORM SLCT61	10	0	25	0	25
NORM SLCT62	10	0	25	1	24
NORM SLCT63	10	0	25	0	25
NORM SLCT64	10	1	25	0	25
NORM SLCT65	10	1	25	1	24
NORM SLCT66	10	0	24	0	24
NORM SLCT67	10	0	24	2	22
NORM SLCT68	10	0	24	0	24
NORM SLCT69	10	1	24	0	24
NORM SLCT70	10	1	24	0	24

NORM SLCT71	10	1	24	0	24
NORM SLCT72	10	1	24	3	21
NORM SLCT73	10	0	23	1	22
NORM SLCT74	10	1	23	0	23
NORM SLCT75	10	1	23	0	23
NORM SLCT76	10	1	23	0	23
NORM SLCT77	10	1	23	0	23
NORM SLCT78	10	0	22	0	22
NORM SLCT79	10	0	22	0	22
NORM SLCT80	10	0	22	.	22
NORM SLCT81	10	0	22	0	22
NORM SLCT82	10	1	22	0	22
NORM SLCT83	10	1	22	0	22
NORM SLCT84	10	1	22	.	22
NORM SLCT85	10	1	22	0	22
NORM SLCT86	10	0	21	0	21
NORM SLCT87	10	0	21	0	21
NORM SLCT88	10	0	21	0	21
NORM SLCT89	10	1	21	0	21
NORM SLCT90	10	1	21	3	18
NORM SLCT91	10	1	21	1	20
NORM SLCT92	10	0	20	0	20
NORM SLCT93	10	0	20	0	20
NORM SLCT94	10	0	20	0	20
NORM SLCT95	10	0	20	0	20
NORM SLCT96	10	0	20	0	20
NORM SLCT97	10	1	20	1	19
NORM SLCT98	10	1	20	1	19
NORM SLCT99	10	1	20	3	17
NORM SLCT100	10	1	20	4	16
NORM SLCT101	10	1	20	1	19
NORM SLCT102	10	1	20	0	20
NORM SLCT103	10	0	19	0	19
NORM SLCT104	10	0	19	0	19
NORM SLCT105	10	0	19	0	19
NORM SLCT106	10	0	19	0	19
NORM SLCT107	10	1	19	3	16

NORM SLCT108	10	1	19	0	19
NORM SLCT109	10	1	19	0	19
NORM SLCT110	10	1	19	0	19
NORM SLCT111	10	0	18	0	18
NORM SLCT112	10	0	18	0	18
NORM SLCT113	10	0	17	0	17
NORM SLCT114	10	0	17	0	17
NORM SLCT115	10	0	17	0	17
NORM SLCT116	10	0	17	0	17
NORM SLCT117	10	1	17	1	16
NORM SLCT118	10	1	17	0	17
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NORM SLCT120	10	0	16	0	16
NORM SLCT121	10	0	16	0	16
NORM SLCT122	10	0	16	0	16
NORM SLCT123	10	0	16	1	15
NORM SLCT124	10	0	16	0	16
NORM SLCT125	10	1	16	0	16
NORM SLCT126	10	1	16	0	16
NORM SLCT127	10	1	16	0	16
NORM SLCT128	10	1	16	0	16
NORM SLCT129	10	1	16	0	16
NORM SLCT130	10	0	15	0	15
NORM SLCT131	10	1	15	0	15
NORM SLCT132	10	1	15	2	13
NORM SLCT133	10	1	15	0	15
NORM SLCT134	10	1	15	0	15
NORM SLCT135	10	1	15	0	15
NORM SLCT136	10	1	15	1	14
NORM SLCT137	10	1	15	0	15
NORM SLCT138	10	0	14	0	14
NORM SLCT139	10	0	14	1	13
NORM SLCT140	10	0	14	0	14
NORM SLCT141	10	0	14	0	14
NORM SLCT142	10	1	14	0	14
NORM SLCT143	10	1	14	0	14
NORM SLCT144	10	1	14	0	14

NORM SLCT145	10	1	14	1	13
NORM SLCT146	10	1	14	0	14
NORM SLCT147	10	1	14	0	14
NORM SLCT148	10	1	14	0	14
NORM SLCT149	10	1	14	0	14
NORM SLCT150	10	1	14	1	13
NORM SLCT151	10	1	14	1	13
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NORM SLCT155	10	1	13	0	13
NORM SLCT156	10	1	13	0	13
NORM SLCT157	10	1	13	0	13
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NORM SLCT159	10	1	13	0	13
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NORM SLCT161	10	1	12	1	11
NORM SLCT162	10	1	12	1	11
NORM SLCT163	10	1	12	6	6
NORM SLCT164	10	0	11	0	11
NORM SLCT165	10	0	11	0	11
NORM SLCT166	10	1	11	0	11
NORM SLCT167	10	1	11	0	11
NORM SLCT168	10	1	11	0	11
NORM SLCT169	10	1	11	0	11
NORM SLCT170	10	0	10	0	10
NORM SLCT171	10	0	10	0	10
NORM SLCT172	10	1	10	0	10
NORM SLCT173	10	1	10	1	9
NORM SLCT174	10	1	10	0	10
NORM SLCT175	10	0	9	0	9
NORM SLCT176	10	1	9	6	3
NORM SLCT177	10	1	9	0	9
NORM SLCT178	10	1	9	0	9
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NORM SLCT181	10	1	8	0	8

NORM SLCT182	10	0	7	0	7
NORM SLCT183	10	1	7	0	7
NORM SLCT184	10	1	7	0	7
NORM SLCT185	10	1	7	3	4
NORM SLCT186	10	0	7	0	6
NORM SLCT187	11	1	39	4	35
NORM SLCT188	11	0	37	0	37
NORM SLCT189	11	0	36	0	36
NORM SLCT190	11	1	36	1	35
NORM SLCT191	11	1	34	0	34
NORM SLCT192	11	1	34	0	34
NORM SLCT193	11	0	33	2	31
NORM SLCT194	11	1	33	0	33
NORM SLCT195	11	0	32	0	32
NORM SLCT196	11	1	32	0	32
NORM SLCT197	11	0	31	1	30
NORM SLCT198	11	0	31	0	31
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NORM SLCT201	11	1	31	0	31
NORM SLCT202	11	1	31	1	30
NORM SLCT203	11	1	31	11	20
NORM SLCT204	11	0	30	0	30
NORM SLCT205	11	0	30	0	30
NORM SLCT206	11	0	29	1	28
NORM SLCT207	11	0	29	0	29
NORM SLCT208	11	0	29	0	29
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NORM SLCT213	11	0	28	0	28
NORM SLCT214	11	0	28	0	28
NORM SLCT215	11	1	28	8	20
NORM SLCT216	11	1	27	0	27
NORM SLCT217	11	1	27	3	24
NORM SLCT218	11	1	27	0	27

NORM SLCT219	11	1	27	0	27
NORM SLCT220	11	1	27	3	24
NORM SLCT221	11	0	26	1	25
NORM SLCT222	11	1	26	0	26
NORM SLCT223	11	1	25	0	25
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NORM SLCT225	11	0	24	0	24
NORM SLCT226	11	1	24	0	24
NORM SLCT227	11	1	24	0	24
NORM SLCT228	11	1	24	.	24
NORM SLCT229	11	0	23	0	23
NORM SLCT230	11	1	23	0	23
NORM SLCT231	11	1	23	1	22
NORM SLCT232	11	1	23	0	23
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NORM SLCT240	11	0	22	0	22
NORM SLCT241	11	0	22	1	21
NORM SLCT242	11	0	22	0	22
NORM SLCT243	11	0	22	1	21
NORM SLCT244	11	0	22	0	22
NORM SLCT245	11	0	22	0	22
NORM SLCT246	11	1	22	0	22
NORM SLCT247	11	1	22	0	22
NORM SLCT248	11	1	22	0	22
NORM SLCT249	11	1	22	0	22
NORM SLCT250	11	1	22	2	20
NORM SLCT251	11	1	22	0	22
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NORM SLCT759	15	0	31	1	30
NORM SLCT760	15	0	31	0	31
NORM SLCT761	15	0	30	0	30
NORM SLCT762	15	0	30	0	30
NORM SLCT763	15	0	30	0	30
NORM SLCT764	15	0	30	0	30
NORM SLCT765	15	0	30	0	30
NORM SLCT766	15	0	30	0	30
NORM SLCT767	15	1	30	0	30
NORM SLCT768	15	0	29	0	29
NORM SLCT769	15	1	29	0	29
NORM SLCT770	15	1	29	0	29
NORM SLCT771	15	1	29	0	29
NORM SLCT772	15	1	29	0	29
NORM SLCT773	15	0	28	0	28

NORM SLCT774	15	1	28	0	28
NORM SLCT775	15	0	27	2	25
NORM SLCT776	15	1	27	0	27
NORM SLCT777	15	1	27	0	27
NORM SLCT778	15	0	26	0	26
NORM SLCT779	15	0	26	0	26
NORM SLCT780	15	0	26	0	26
NORM SLCT781	15	1	25	0	25
NORM SLCT782	15	1	25	0	25
NORM SLCT783	15	1	24	0	24
NORM SLCT784	15	1	24	0	24
NORM SLCT785	15	0	23	0	23
NORM SLCT786	15	0	23	0	23
NORM SLCT787	15	1	22	0	22
NORM SLCT788	15	1	22	0	22
NORM SLCT789	15	1	22	0	22
NORM SLCT790	15	1	22	0	22
NORM SLCT791	15	1	21	0	21
NORM SLCT792	15	0	20	0	20
NORM SLCT793	15	1	19	0	19
NORM SLCT794	15	1	18	1	17
NORM SLCT795	15	1	17	0	17
NORM SLCT796	15	1	13	0	13
NORM SLCT797	15	1	13	0	13
NORM SLCT798	15	1	10	0	10
NORM SLCT799	16	1	49	1	48
NORM SLCT800	16	0	47	0	47
NORM SLCT801	16	1	43	0	43
NORM SLCT802	16	1	42	0	42
NORM SLCT803	16	1	41	0	41
NORM SLCT804	16	1	40	0	40
NORM SLCT805	16	0	39	0	39
NORM SLCT806	16	0	37	0	37
NORM SLCT807	16	0	36	0	36
NORM SLCT808	16	0	35	0	35
NORM SLCT809	16	0	33	1	32
NORM SLCT810	16	0	31	0	31

NORM SLCT811	16	0	29	0	29
NORM SLCT812	16	0	26	0	26
NORM SLCT813	16	1	25	0	25
NORM SLCT814	16	1	25	0	25
NORM SLCT815	16	1	25	0	25
NORM SLCT816	16	1	24	0	24
NORM SLCT817	16	1	20	0	20
NORM SLCT818	16	1	14	0	14
NORM SLCT819	16	1	10	0	10

Table 5.2.1.B: Total score, score for wrong substitution, and net score of digit letter substitution test for normative scores.

SLCODE	AGE	SEX	Total Score	Wrong Score	Net Score
NORM DLST1	11	0	12	0	12
NORM DLST2	12	1	13	0	13
NORM DLST3	10	0	18	1	17
NORM DLST4	10	0	17	0	17
NORM DLST5	11	1	17	0	17
NORM DLST6	12	1	22	2	20
NORM DLST7	9	1	21	0	21
NORM DLST8	9	1	21	0	21
NORM DLST9	10	1	21	0	21
NORM DLST10	11	1	21	0	21
NORM DLST11	11	1	21	0	21
NORM DLST12	10	1	26	4	22
NORM DLST13	10	1	22	0	22
NORM DLST14	10	1	22	0	22
NORM DLST15	15	1	22	0	22
NORM DLST16	9	1	23	0	23
NORM DLST17	10	1	24	1	23
NORM DLST18	10	0	23	0	23
NORM DLST19	9	1	24	0	24
NORM DLST20	10	1	25	1	24
NORM DLST21	10	0	24	0	24
NORM DLST22	10	1	24	0	24
NORM DLST23	10	1	24	0	24
NORM DLST24	11	0	27	3	24
NORM DLST25	11	1	24	0	24
NORM DLST26	15	1	24	0	24
NORM DLST27	9	1	25	0	25
NORM DLST28	10	0	25	0	25
NORM DLST29	10	1	25	0	25
NORM DLST30	10	1	25	0	25
NORM DLST31	11	1	26	1	25
NORM DLST32	9	0	26	0	26
NORM DLST33	9	0	26	0	26

NORM DLST34	9	1	26	0	26
NORM DLST35	10	0	27	1	26
NORM DLST36	10	1	27	1	26
NORM DLST37	10	0	26	0	26
NORM DLST38	10	1	26	0	26
NORM DLST39	10	1	26	0	26
NORM DLST40	10	1	26	0	26
NORM DLST41	11	1	26	0	26
NORM DLST42	11	1	26	0	26
NORM DLST43	11	1	26	0	26
NORM DLST44	12	1	26	0	26
NORM DLST45	14	1	26	0	26
NORM DLST46	9	1	27	0	27
NORM DLST47	10	1	29	2	27
NORM DLST48	10	0	27	0	27
NORM DLST49	10	0	27	0	27
NORM DLST50	10	0	27	0	27
NORM DLST51	10	0	27	0	27
NORM DLST52	10	1	27	0	27
NORM DLST53	10	1	27	0	27
NORM DLST54	10	1	27	0	27
NORM DLST55	10	1	27	0	27
NORM DLST56	11	1	28	1	27
NORM DLST57	11	0	27	0	27
NORM DLST58	11	0	27	0	27
NORM DLST59	11	1	27	0	27
NORM DLST60	13	1	27	0	27
NORM DLST61	10	0	28	0	28
NORM DLST62	10	1	28	0	28
NORM DLST63	10	1	28	0	28
NORM DLST64	10	1	28	0	28
NORM DLST65	10	1	28	0	28
NORM DLST66	10	1	28	0	28
NORM DLST67	10	1	28	0	28
NORM DLST68	11	1	28	0	28
NORM DLST69	11	1	28	0	28
NORM DLST70	12	1	28	0	28

NORM DLST71	9	1	29	0	29
NORM DLST72	10	0	29	0	29
NORM DLST73	10	1	29	0	29
NORM DLST74	10	1	29	0	29
NORM DLST75	11	1	29	0	29
NORM DLST76	12	1	29	0	29
NORM DLST77	12	1	29	0	29
NORM DLST78	12	1	29	0	29
NORM DLST79	12	1	29	0	29
NORM DLST80	9	1	30	0	30
NORM DLST81	9	1	30	0	30
NORM DLST82	10	0	30	0	30
NORM DLST83	10	1	30	0	30
NORM DLST84	10	1	30	0	30
NORM DLST85	11	1	31	1	30
NORM DLST86	11	1	31	1	30
NORM DLST87	11	1	31	1	30
NORM DLST88	11	0	30	0	30
NORM DLST89	11	1	30	0	30
NORM DLST90	11	1	30	0	30
NORM DLST91	12	1	31	1	30
NORM DLST92	12	0	30	0	30
NORM DLST93	12	0	30	0	30
NORM DLST94	12	1	30	0	30
NORM DLST95	12	1	30	0	30
NORM DLST96	12	1	30	0	30
NORM DLST97	12	1	30	0	30
NORM DLST98	12	1	30	0	30
NORM DLST99	9	1	31	0	31
NORM DLST100	9	1	31	0	31
NORM DLST101	10	0	31	0	31
NORM DLST102	10	1	31	0	31
NORM DLST103	10	1	31	0	31
NORM DLST104	10	1	31	0	31
NORM DLST105	10	1	31	0	31
NORM DLST106	11	1	31	0	31
NORM DLST107	12	1	31	0	31

NORM DLST108	13	0	31	0	31
NORM DLST109	13	1	31	0	31
NORM DLST110	9	1	36	4	32
NORM DLST111	9	0	32	0	32
NORM DLST112	9	1	32	0	32
NORM DLST113	9	1	32	0	32
NORM DLST114	10	0	35	3	32
NORM DLST115	10	1	33	1	32
NORM DLST116	10	0	32	0	32
NORM DLST117	10	1	32	0	32
NORM DLST118	10	1	32	0	32
NORM DLST119	10	1	32	0	32
NORM DLST120	10	1	32	0	32
NORM DLST121	10	1	32	0	32
NORM DLST122	10	1	32	0	32
NORM DLST123	11	1	33	1	32
NORM DLST124	11	1	32	0	32
NORM DLST125	13	0	32	0	32
NORM DLST126	14	1	32	0	32
NORM DLST127	10	0	33	0	33
NORM DLST128	10	1	33	0	33
NORM DLST129	11	1	35	2	33
NORM DLST130	11	0	34	1	33
NORM DLST131	11	1	34	1	33
NORM DLST132	11	0	33	0	33
NORM DLST133	11	1	33	0	33
NORM DLST134	12	0	33	0	33
NORM DLST135	12	0	33	0	33
NORM DLST136	12	1	33	0	33
NORM DLST137	12	1	33	0	33
NORM DLST138	12	1	33	0	33
NORM DLST139	9	1	34	0	34
NORM DLST140	10	1	38	4	34
NORM DLST141	10	1	36	2	34
NORM DLST142	10	1	34	0	34
NORM DLST143	10	0	34	0	34
NORM DLST144	10	0	34	0	34

NORM DLST145	10	1	34	0	34
NORM DLST146	10	1	34	0	34
NORM DLST147	10	1	34	0	34
NORM DLST148	11	0	34	0	34
NORM DLST149	11	1	34	0	34
NORM DLST150	12	0	34	0	34
NORM DLST151	12	1	34	0	34
NORM DLST152	12	1	34	0	34
NORM DLST153	15	1	34	0	34
NORM DLST154	10	1	36	1	35
NORM DLST155	10	0	35	0	35
NORM DLST156	10	1	35	0	35
NORM DLST157	10	1	35	0	35
NORM DLST158	10	1	35	0	35
NORM DLST159	11	1	35	0	35
NORM DLST160	11	1	35	0	35
NORM DLST161	11	1	35	0	35
NORM DLST162	11	1	35	0	35
NORM DLST163	11	1	35	0	35
NORM DLST164	13	1	35	0	35
NORM DLST165	9	0	36	0	36
NORM DLST166	9	0	36	0	36
NORM DLST167	9	0	36	0	36
NORM DLST168	9	0	36	0	36
NORM DLST169	9	1	36	0	36
NORM DLST170	10	0	38	2	36
NORM DLST171	10	1	37	1	36
NORM DLST172	10	0	36	0	36
NORM DLST173	10	1	36	0	36
NORM DLST174	10	1	36	0	36
NORM DLST175	10	1	36	0	36
NORM DLST176	10	1	36	0	36
NORM DLST177	10	1	36	0	36
NORM DLST178	10	1	36	0	36
NORM DLST179	11	1	37	1	36
NORM DLST180	11	1	36	0	36
NORM DLST181	11	1	36	0	36

NORM DLST182	11	0	36	0	36
NORM DLST183	11	0	36	0	36
NORM DLST184	11	0	36	0	36
NORM DLST185	11	1	36	0	36
NORM DLST186	11	1	36	0	36
NORM DLST187	11	1	36	0	36
NORM DLST188	11	1	36	0	36
NORM DLST189	11	1	36	0	36
NORM DLST190	11	1	36	0	36
NORM DLST191	11	1	36	0	36
NORM DLST192	12	0	36	0	36
NORM DLST193	12	0	36	0	36
NORM DLST194	12	1	36	0	36
NORM DLST195	12	1	36	0	36
NORM DLST196	12	1	36	0	36
NORM DLST197	12	1	36	0	36
NORM DLST198	12	1	36	0	36
NORM DLST199	12	1	36	0	36
NORM DLST200	12	1	36	0	36
NORM DLST201	13	1	38	2	36
NORM DLST202	13	1	36	0	36
NORM DLST203	14	1	36	0	36
NORM DLST204	14	1	36	0	36
NORM DLST205	14	1	36	0	36
NORM DLST206	10	0	38	1	37
NORM DLST207	10	0	37	0	37
NORM DLST208	10	1	37	0	37
NORM DLST209	10	1	37	0	37
NORM DLST210	10	1	37	0	37
NORM DLST211	10	1	37	0	37
NORM DLST212	11	1	37	0	37
NORM DLST213	11	1	37	0	37
NORM DLST214	12	1	37	0	37
NORM DLST215	12	1	37	0	37
NORM DLST216	12	1	37	0	37
NORM DLST217	12	1	37	0	37
NORM DLST218	12	1	37	0	37

NORM DLST219	13	1	37	0	37
NORM DLST220	16	1	37	0	37
NORM DLST221	9	0	38	0	38
NORM DLST222	10	0	42	4	38
NORM DLST223	10	0	38	0	38
NORM DLST224	10	0	38	0	38
NORM DLST225	10	0	38	0	38
NORM DLST226	10	0	38	0	38
NORM DLST227	10	1	38	0	38
NORM DLST228	10	1	38	0	38
NORM DLST229	10	1	38	0	38
NORM DLST230	10	1	38	0	38
NORM DLST231	10	1	38	0	38
NORM DLST232	10	1	38	0	38
NORM DLST233	11	1	38	0	38
NORM DLST234	11	1	38	0	38
NORM DLST235	11	1	38	0	38
NORM DLST236	11	1	38	0	38
NORM DLST237	11	1	38	0	38
NORM DLST238	12	0	38	0	38
NORM DLST239	12	1	38	0	38
NORM DLST240	12	1	38	0	38
NORM DLST241	13	1	38	0	38
NORM DLST242	16	1	38	0	38
NORM DLST243	10	0	39	0	39
NORM DLST244	10	0	39	0	39
NORM DLST245	10	1	39	0	39
NORM DLST246	10	1	39	0	39
NORM DLST247	10	1	39	0	39
NORM DLST248	10	1	39	0	39
NORM DLST249	11	1	39	0	39
NORM DLST250	11	0	39	0	39
NORM DLST251	11	1	39	0	39
NORM DLST252	11	1	39	0	39
NORM DLST253	12	1	39	0	39
NORM DLST254	12	1	39	0	39
NORM DLST255	12	1	39	0	39

NORM DLST256	13	0	39	0	39
NORM DLST257	14	1	39	0	39
NORM DLST258	9	0	40	0	40
NORM DLST259	10	1	43	3	40
NORM DLST260	10	0	40	0	40
NORM DLST261	10	0	40	0	40
NORM DLST262	10	0	40	0	40
NORM DLST263	10	0	40	0	40
NORM DLST264	10	0	40	0	40
NORM DLST265	10	1	40	0	40
NORM DLST266	10	1	40	0	40
NORM DLST267	10	1	40	0	40
NORM DLST268	10	1	40	0	40
NORM DLST269	10	1	40	0	40
NORM DLST270	11	1	40	0	40
NORM DLST271	11	1	40	0	40
NORM DLST272	11	1	40	0	40
NORM DLST273	11	1	40	0	40
NORM DLST274	11	1	40	0	40
NORM DLST275	11	1	40	0	40
NORM DLST276	12	0	40	0	40
NORM DLST277	12	1	40	0	40
NORM DLST278	12	1	40	0	40
NORM DLST279	12	1	40	0	40
NORM DLST280	12	1	40	0	40
NORM DLST281	12	1	40	0	40
NORM DLST282	12	1	40	0	40
NORM DLST283	12	1	40	0	40
NORM DLST284	13	1	40	0	40
NORM DLST285	13	1	40	0	40
NORM DLST286	10	0	42	1	41
NORM DLST287	10	0	41	0	41
NORM DLST288	10	1	41	0	41
NORM DLST289	10	1	41	0	41
NORM DLST290	10	1	41	0	41
NORM DLST291	10	1	41	0	41
NORM DLST292	11	1	41	0	41

NORM DLST293	11	1	41	0	41
NORM DLST294	11	1	41	0	41
NORM DLST295	11	1	41	0	41
NORM DLST296	11	1	41	0	41
NORM DLST297	12	1	42	1	41
NORM DLST298	12	1	41	0	41
NORM DLST299	12	1	41	0	41
NORM DLST300	12	1	41	0	41
NORM DLST301	14	0	41	0	41
NORM DLST302	14	1	41	0	41
NORM DLST303	10	0	43	1	42
NORM DLST304	10	0	42	0	42
NORM DLST305	10	0	42	0	42
NORM DLST306	10	0	42	0	42
NORM DLST307	10	0	42	0	42
NORM DLST308	10	1	42	0	42
NORM DLST309	10	1	42	0	42
NORM DLST310	10	1	42	0	42
NORM DLST311	11	1	44	2	42
NORM DLST312	11	0	42	0	42
NORM DLST313	11	1	42	0	42
NORM DLST314	11	1	42	0	42
NORM DLST315	11	1	42	0	42
NORM DLST316	11	1	42	0	42
NORM DLST317	12	0	42	0	42
NORM DLST318	12	0	42	0	42
NORM DLST319	12	0	42	0	42
NORM DLST320	12	1	42	0	42
NORM DLST321	12	1	42	0	42
NORM DLST322	12	1	42	0	42
NORM DLST323	12	1	42	0	42
NORM DLST324	13	1	42	0	42
NORM DLST325	13	1	42	0	42
NORM DLST326	14	0	42	0	42
NORM DLST327	14	1	42	0	42
NORM DLST328	14	1	42	0	42
NORM DLST329	10	0	43	0	43

NORM DLST330	10	0	43	0	43
NORM DLST331	10	1	43	0	43
NORM DLST332	11	0	44	1	43
NORM DLST333	11	1	43	0	43
NORM DLST334	11	0	43	0	43
NORM DLST335	11	1	43	0	43
NORM DLST336	11	1	43	0	43
NORM DLST337	12	0	46	3	43
NORM DLST338	12	0	43	0	43
NORM DLST339	12	1	43	0	43
NORM DLST340	12	1	43	0	43
NORM DLST341	12	1	43	0	43
NORM DLST342	12	1	43	0	43
NORM DLST343	12	1	43	0	43
NORM DLST344	12	1	43	0	43
NORM DLST345	12	1	43	0	43
NORM DLST346	12	1	43	0	43
NORM DLST347	13	0	43	0	43
NORM DLST348	13	0	43	0	43
NORM DLST349	13	1	43	0	43
NORM DLST350	13	1	43	0	43
NORM DLST351	13	1	43	0	43
NORM DLST352	14	0	43	0	43
NORM DLST353	14	0	43	0	43
NORM DLST354	10	0	44	0	44
NORM DLST355	10	0	44	0	44
NORM DLST356	10	1	44	0	44
NORM DLST357	11	1	45	1	44
NORM DLST358	11	0	44	0	44
NORM DLST359	11	1	44	0	44
NORM DLST360	11	1	44	0	44
NORM DLST361	11	1	44	0	44
NORM DLST362	12	0	44	0	44
NORM DLST363	12	0	44	0	44
NORM DLST364	12	1	44	0	44
NORM DLST365	12	1	44	0	44
NORM DLST366	12	1	44	0	44

NORM DLST367	13	0	44	0	44
NORM DLST368	13	1	44	0	44
NORM DLST369	14	0	44	0	44
NORM DLST370	14	1	44	0	44
NORM DLST371	14	1	44	0	44
NORM DLST372	10	1	48	3	45
NORM DLST373	10	0	45	0	45
NORM DLST374	10	0	45	0	45
NORM DLST375	10	0	45	0	45
NORM DLST376	10	1	45	0	45
NORM DLST377	10	1	45	0	45
NORM DLST378	11	0	46	1	45
NORM DLST379	11	1	46	1	45
NORM DLST380	11	0	45	0	45
NORM DLST381	11	0	45	0	45
NORM DLST382	11	0	45	0	45
NORM DLST383	11	0	45	0	45
NORM DLST384	11	0	45	0	45
NORM DLST385	11	1	45	0	45
NORM DLST386	11	1	45	0	45
NORM DLST387	12	0	45	0	45
NORM DLST388	12	0	45	0	45
NORM DLST389	12	1	45	0	45
NORM DLST390	12	1	45	0	45
NORM DLST391	12	1	45	0	45
NORM DLST392	12	1	45	0	45
NORM DLST393	12	1	45	0	45
NORM DLST394	12	1	45	0	45
NORM DLST395	12	1	45	0	45
NORM DLST396	12	1	45	0	45
NORM DLST397	12	1	45	0	45
NORM DLST398	12	1	45	0	45
NORM DLST399	12	1	45	0	45
NORM DLST400	13	0	45	0	45
NORM DLST401	13	0	45	0	45
NORM DLST402	13	0	45	0	45
NORM DLST403	13	1	45	0	45

NORM DLST404	13	1	45	0	45
NORM DLST405	14	1	48	3	45
NORM DLST406	14	0	45	0	45
NORM DLST407	14	0	45	0	45
NORM DLST408	14	1	45	0	45
NORM DLST409	14	1	45	0	45
NORM DLST410	15	1	45	0	45
NORM DLST411	9	1	46	0	46
NORM DLST412	10	0	46	0	46
NORM DLST413	10	0	46	0	46
NORM DLST414	10	0	46	0	46
NORM DLST415	10	0	46	0	46
NORM DLST416	10	0	46	0	46
NORM DLST417	11	1	46	0	46
NORM DLST418	11	0	46	0	46
NORM DLST419	11	1	46	0	46
NORM DLST420	11	1	46	0	46
NORM DLST421	12	0	46	0	46
NORM DLST422	12	1	46	0	46
NORM DLST423	12	1	46	0	46
NORM DLST424	13	0	46	0	46
NORM DLST425	13	0	46	0	46
NORM DLST426	13	0	46	0	46
NORM DLST427	10	0	47	0	47
NORM DLST428	10	1	47	0	47
NORM DLST429	11	0	50	3	47
NORM DLST430	11	1	48	1	47
NORM DLST431	11	1	47	0	47
NORM DLST432	11	1	47	0	47
NORM DLST433	11	1	47	0	47
NORM DLST434	12	0	47	0	47
NORM DLST435	12	1	47	0	47
NORM DLST436	12	1	47	0	47
NORM DLST437	12	1	47	0	47
NORM DLST438	12	1	47	0	47
NORM DLST439	13	1	48	1	47
NORM DLST440	13	1	48	1	47

NORM DLST441	13	0	47	0	47
NORM DLST442	13	0	47	0	47
NORM DLST443	13	1	47	0	47
NORM DLST444	13	1	47	0	47
NORM DLST445	14	1	48	1	47
NORM DLST446	15	1	47	0	47
NORM DLST447	10	0	48	0	48
NORM DLST448	10	0	48	0	48
NORM DLST449	11	0	48	0	48
NORM DLST450	11	0	48	0	48
NORM DLST451	11	0	48	0	48
NORM DLST452	11	0	48	0	48
NORM DLST453	11	1	48	0	48
NORM DLST454	11	1	48	0	48
NORM DLST455	12	0	48	0	48
NORM DLST456	12	0	48	0	48
NORM DLST457	12	1	48	0	48
NORM DLST458	12	1	48	0	48
NORM DLST459	12	1	48	0	48
NORM DLST460	12	1	48	0	48
NORM DLST461	12	1	48	0	48
NORM DLST462	12	1	48	0	48
NORM DLST463	12	1	48	0	48
NORM DLST464	13	0	48	0	48
NORM DLST465	13	0	48	0	48
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NORM DLST469	13	1	48	0	48
NORM DLST470	13	1	48	0	48
NORM DLST471	13	1	48	0	48
NORM DLST472	14	0	48	0	48
NORM DLST473	14	0	48	0	48
NORM DLST474	14	0	48	0	48
NORM DLST475	14	1	48	0	48
NORM DLST476	14	1	48	0	48
NORM DLST477	15	1	48	0	48

NORM DLST478	15	1	48	0	48
NORM DLST479	15	1	48	0	48
NORM DLST480	9	0	49	0	49
NORM DLST481	10	0	49	0	49
NORM DLST482	10	0	49	0	49
NORM DLST483	10	1	49	0	49
NORM DLST484	11	0	49	0	49
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NORM DLST501	15	1	49	0	49
NORM DLST502	10	1	50	0	50
NORM DLST503	11	1	51	1	50
NORM DLST504	11	0	50	0	50
NORM DLST505	11	0	50	0	50
NORM DLST506	11	0	50	0	50
NORM DLST507	11	1	50	0	50
NORM DLST508	11	1	50	0	50
NORM DLST509	12	0	51	1	50
NORM DLST510	12	0	50	0	50
NORM DLST511	12	0	50	0	50
NORM DLST512	12	0	50	0	50
NORM DLST513	12	1	50	0	50
NORM DLST514	12	1	50	0	50

NORM DLST515	13	1	51	1	50
NORM DLST516	13	1	50	0	50
NORM DLST517	13	1	50	0	50
NORM DLST518	14	0	50	0	50
NORM DLST519	14	1	50	0	50
NORM DLST520	15	1	50	0	50
NORM DLST521	11	0	51	0	51
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NORM DLST533	14	0	51	0	51
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NORM DLST537	15	1	51	0	51
NORM DLST538	15	1	51	0	51
NORM DLST539	16	1	51	0	51
NORM DLST540	10	0	52	0	52
NORM DLST541	11	0	52	0	52
NORM DLST542	11	0	52	0	52
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NORM DLST547	13	1	53	1	52
NORM DLST548	13	0	52	0	52
NORM DLST549	13	0	52	0	52
NORM DLST550	13	0	52	0	52
NORM DLST551	13	1	52	0	52

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NORM DLST553	14	0	52	0	52
NORM DLST554	14	1	52	0	52
NORM DLST555	14	1	52	0	52
NORM DLST556	14	1	52	0	52
NORM DLST557	14	1	52	0	52
NORM DLST558	14	1	52	0	52
NORM DLST559	15	0	52	0	52
NORM DLST560	15	0	52	0	52
NORM DLST561	15	1	52	0	52
NORM DLST562	10	0	53	0	53
NORM DLST563	11	0	53	0	53
NORM DLST564	11	1	53	0	53
NORM DLST565	11	1	53	0	53
NORM DLST566	12	1	54	1	53
NORM DLST567	12	0	53	0	53
NORM DLST568	12	0	53	0	53
NORM DLST569	12	0	53	0	53
NORM DLST570	12	0	53	0	53
NORM DLST571	12	0	53	0	53
NORM DLST572	12	0	53	0	53
NORM DLST573	12	1	53	0	53
NORM DLST574	12	1	53	0	53
NORM DLST575	12	1	53	0	53
NORM DLST576	12	1	53	0	53
NORM DLST577	13	0	53	0	53
NORM DLST578	13	0	53	0	53
NORM DLST579	13	1	53	0	53
NORM DLST580	13	1	53	0	53
NORM DLST581	13	1	53	0	53
NORM DLST582	13	1	53	0	53
NORM DLST583	14	1	53	0	53
NORM DLST584	14	1	53	0	53
NORM DLST585	14	1	53	0	53
NORM DLST586	14	1	53	0	53
NORM DLST587	10	0	54	0	54
NORM DLST588	11	1	54	0	54

NORM DLST589	11	1	54	0	54
NORM DLST590	12	0	54	0	54
NORM DLST591	12	1	54	0	54
NORM DLST592	13	0	54	0	54
NORM DLST593	14	0	54	0	54
NORM DLST594	14	1	54	0	54
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NORM DLST610	14	1	55	0	55
NORM DLST611	15	0	55	0	55
NORM DLST612	16	0	55	0	55
NORM DLST613	16	1	55	0	55
NORM DLST614	16	1	55	0	55
NORM DLST615	12	1	56	0	56
NORM DLST616	13	0	56	0	56
NORM DLST617	13	1	56	0	56
NORM DLST618	13	1	56	0	56
NORM DLST619	13	1	56	0	56
NORM DLST620	14	0	56	0	56
NORM DLST621	14	1	56	0	56
NORM DLST622	14	1	56	0	56
NORM DLST623	14	1	56	0	56
NORM DLST624	14	1	56	0	56
NORM DLST625	15	1	56	0	56

NORM DLST626	15	1	56	0	56
NORM DLST627	16	1	56	0	56
NORM DLST628	11	0	57	0	57
NORM DLST629	12	0	57	0	57
NORM DLST630	12	1	57	0	57
NORM DLST631	13	0	58	1	57
NORM DLST632	13	0	57	0	57
NORM DLST633	13	0	57	0	57
NORM DLST634	13	1	57	0	57
NORM DLST635	13	1	57	0	57
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NORM DLST637	14	0	57	0	57
NORM DLST638	14	1	57	0	57
NORM DLST639	15	0	57	0	57
NORM DLST640	15	0	57	0	57
NORM DLST641	15	1	57	0	57
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NORM DLST643	10	0	58	0	58
NORM DLST644	11	1	58	0	58
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NORM DLST646	12	1	58	0	58
NORM DLST647	13	0	58	0	58
NORM DLST648	14	0	58	0	58
NORM DLST649	14	1	58	0	58
NORM DLST650	15	0	58	0	58
NORM DLST651	15	1	58	0	58
NORM DLST652	15	1	58	0	58
NORM DLST653	11	1	60	1	59
NORM DLST654	12	0	59	0	59
NORM DLST655	12	1	59	0	59
NORM DLST656	13	1	60	1	59
NORM DLST657	13	1	60	1	59
NORM DLST658	13	0	59	0	59
NORM DLST659	13	0	59	0	59
NORM DLST660	13	0	59	0	59
NORM DLST661	14	1	59	0	59
NORM DLST662	10	0	60	0	60

NORM DLST663	12	0	60	0	60
NORM DLST664	12	1	60	0	60
NORM DLST665	12	1	60	0	60
NORM DLST666	13	0	60	0	60
NORM DLST667	13	0	60	0	60
NORM DLST668	13	0	60	0	60
NORM DLST669	13	1	60	0	60
NORM DLST670	13	1	60	0	60
NORM DLST671	13	1	60	0	60
NORM DLST672	13	1	60	0	60
NORM DLST673	13	1	60	0	60
NORM DLST674	13	1	60	0	60
NORM DLST675	14	1	61	1	60
NORM DLST676	14	1	60	0	60
NORM DLST677	14	1	60	0	60
NORM DLST678	14	1	60	0	60
NORM DLST679	14	1	60	0	60
NORM DLST680	14	1	60	0	60
NORM DLST681	15	1	61	1	60
NORM DLST682	15	0	60	0	60
NORM DLST683	15	0	60	0	60
NORM DLST684	15	0	60	0	60
NORM DLST685	15	1	60	0	60
NORM DLST686	15	1	60	0	60
NORM DLST687	15	1	60	0	60
NORM DLST688	15	1	60	0	60
NORM DLST689	16	1	60	0	60
NORM DLST690	11	1	61	0	61
NORM DLST691	12	0	61	0	61
NORM DLST692	12	1	61	0	61
NORM DLST693	13	0	61	0	61
NORM DLST694	13	0	61	0	61
NORM DLST695	13	0	61	0	61
NORM DLST696	13	0	61	0	61
NORM DLST697	13	1	61	0	61
NORM DLST698	13	1	61	0	61
NORM DLST699	13	1	61	0	61

NORM DLST700	14	0	61	0	61
NORM DLST701	14	1	61	0	61
NORM DLST702	15	0	61	0	61
NORM DLST703	11	0	62	0	62
NORM DLST704	11	0	62	0	62
NORM DLST705	12	1	63	1	62
NORM DLST706	12	0	62	0	62
NORM DLST707	12	1	62	0	62
NORM DLST708	12	1	62	0	62
NORM DLST709	13	0	62	0	62
NORM DLST710	13	0	62	0	62
NORM DLST711	13	1	62	0	62
NORM DLST712	13	1	62	0	62
NORM DLST713	13	1	62	0	62
NORM DLST714	14	1	62	0	62
NORM DLST715	15	0	62	0	62
NORM DLST716	15	0	62	0	62
NORM DLST717	15	0	62	0	62
NORM DLST718	15	1	62	0	62
NORM DLST719	13	0	63	0	63
NORM DLST720	13	0	63	0	63
NORM DLST721	13	0	63	0	63
NORM DLST722	13	1	63	0	63
NORM DLST723	13	1	63	0	63
NORM DLST724	13	1	63	0	63
NORM DLST725	13	1	63	0	63
NORM DLST726	14	0	63	0	63
NORM DLST727	14	1	63	0	63
NORM DLST728	14	1	63	0	63
NORM DLST729	14	1	63	0	63
NORM DLST730	14	1	63	0	63
NORM DLST731	15	0	63	0	63
NORM DLST732	15	1	63	0	63
NORM DLST733	16	1	64	1	63
NORM DLST734	16	1	63	0	63
NORM DLST735	12	0	64	0	64
NORM DLST736	12	0	64	0	64

NORM DLST737	12	0	64	0	64
NORM DLST738	12	1	64	0	64
NORM DLST739	14	1	64	0	64
NORM DLST740	15	1	64	0	64
NORM DLST741	15	1	64	0	64
NORM DLST742	16	0	64	0	64
NORM DLST743	12	1	65	0	65
NORM DLST744	13	0	65	0	65
NORM DLST745	13	0	65	0	65
NORM DLST746	14	1	65	0	65
NORM DLST747	14	1	65	0	65
NORM DLST748	14	1	65	0	65
NORM DLST749	15	0	65	0	65
NORM DLST750	15	0	65	0	65
NORM DLST751	15	0	65	0	65
NORM DLST752	13	0	66	0	66
NORM DLST753	13	0	66	0	66
NORM DLST754	13	1	66	0	66
NORM DLST755	14	1	66	0	66
NORM DLST756	15	1	67	1	66
NORM DLST757	15	0	66	0	66
NORM DLST758	15	0	66	0	66
NORM DLST759	15	1	66	0	66
NORM DLST760	15	1	66	0	66
NORM DLST761	12	0	67	0	67
NORM DLST762	13	0	67	0	67
NORM DLST763	13	1	67	0	67
NORM DLST764	13	1	67	0	67
NORM DLST765	14	0	67	0	67
NORM DLST766	14	1	67	0	67
NORM DLST767	14	1	67	0	67
NORM DLST768	15	1	68	1	67
NORM DLST769	13	0	68	0	68
NORM DLST770	14	1	68	0	68
NORM DLST771	14	1	68	0	68
NORM DLST772	15	0	68	0	68
NORM DLST773	15	0	68	0	68

NORM DLST774	15	0	68	0	68
NORM DLST775	15	1	68	0	68
NORM DLST776	15	1	68	0	68
NORM DLST777	15	0	69	0	69
NORM DLST778	15	0	69	0	69
NORM DLST779	15	0	69	0	69
NORM DLST780	15	1	69	0	69
NORM DLST781	15	1	69	0	69
NORM DLST782	13	0	70	0	70
NORM DLST783	13	0	70	0	70
NORM DLST784	13	0	70	0	70
NORM DLST785	15	0	70	0	70
NORM DLST786	13	0	71	0	71
NORM DLST787	13	0	71	0	71
NORM DLST788	13	1	71	0	71
NORM DLST789	12	1	72	0	72
NORM DLST790	13	0	72	0	72
NORM DLST791	13	0	72	0	72
NORM DLST792	13	0	72	0	72
NORM DLST793	13	0	72	0	72
NORM DLST794	14	0	72	0	72
NORM DLST795	14	0	72	0	72
NORM DLST796	14	0	72	0	72
NORM DLST797	14	1	72	0	72
NORM DLST798	14	1	72	0	72
NORM DLST799	14	1	72	0	72
NORM DLST800	14	1	72	0	72
NORM DLST801	15	0	72	0	72
NORM DLST802	15	1	72	0	72
NORM DLST803	16	0	72	0	72
NORM DLST804	16	0	72	0	72
NORM DLST805	16	0	72	0	72
NORM DLST806	16	1	72	0	72
NORM DLST807	13	0	73	0	73
NORM DLST808	14	0	73	0	73
NORM DLST809	16	0	73	0	73
NORM DLST810	16	0	73	0	73

NORM DLST811	13	0	74	0	74
NORM DLST812	13	1	74	0	74
NORM DLST813	14	0	75	1	74
NORM DLST814	14	0	74	0	74
NORM DLST815	14	0	74	0	74
NORM DLST816	15	0	74	0	74
NORM DLST817	15	1	74	0	74
NORM DLST818	14	1	75	0	75
NORM DLST819	16	0	75	0	75
NORM DLST820	16	1	75	0	75
NORM DLST821	16	0	77	0	77
NORM DLST822	13	0	78	0	78
NORM DLST823	15	1	79	1	78
NORM DLST824	15	0	78	0	78
NORM DLST825	15	0	78	0	78
NORM DLST826	15	0	79	0	79
NORM DLST827	15	0	81	0	81
NORM DLST828	14	0	82	0	82
NORM DLST829	13	0	84	0	84
NORM DLST830	15	0	84	0	84
NORM DLST831	15	0	85	0	85
NORM DLST832	15	1	87	1	86
NORM DLST833	15	1	86	0	86
NORM DLST834	14	1	87	0	87
NORM DLST835	14	1	87	0	87
NORM DLST836	13	0	90	0	90
NORM DLST837	13	0	96	0	96
NORM DLST838	13	1	96	0	96
NORM DLST839	15	0	96	0	96
NORM DLST840	15	1	96	0	96
NORM DLST841	15	1	96	0	96
NORM DLST842	15	1	96	0	96
NORM DLST843	16	0	96	0	96

Table 5.3.1: Total score, score for wrong cancellation, and net score of six letter cancellation test administered in Pre and Post states of cyclic meditation session and supine rest session.

			Cyclic Meditation						Supine Rest					
SLCODE	**AGE**	**SEX**	**Pre Total Score**	**Post Total Score**	**Pre Wrong Score**	**Post Wrong Score**	**Pre Net Score**	**Post Net Score**	**Pre Total Score**	**Post Total Score**	**Pre Wrong Score**	**Post Wrong Score**	**Pre Net Score**	**Post Net Score**
SLCT1	13	0	40	33	0	2	40	31	48	55	1	0	47	55
SLCT2	13	0	25	31	3	2	22	29	36	43	0	0	36	43
SLCT3	13	0	33	35	3	0	30	35	36	40	1	0	35	40
SLCT4	13	0	27	33	2	0	25	33	38	42	1	1	37	41
SLCT5	13	0	25	36	0	0	25	36	38	41	0	0	38	41
SLCT6	13	0	48	61	0	0	48	61	57	57	0	0	57	57
SLCT7	13	1	21	36	0	0	21	36	44	58	2	2	42	56
SLCT8	13	1	24	30	1	0	23	30	35	46	0	0	35	46
SLCT9	13	1	29	30	2	0	27	30	39	49	0	0	39	49
SLCT10	13	1	22	37	0	0	22	37	29	32	0	0	29	32
SLCT11	13	1	20	31	0	0	20	31	35	38	0	0	35	38
SLCT12	13	1	37	45	0	0	37	45	43	46	0	0	43	46
SLCT13	13	1	50	55	0	0	50	55	63	65	0	0	63	65
SLCT14	13	1	19	21	0	1	19	20	31	31	2	0	29	31
SLCT15	13	1	31	31	0	0	31	31	36	38	0	0	36	38
SLCT16	13	1	34	43	0	0	34	43	43	42	0	0	43	40
SLCT17	13	1	21	21	0	0	21	21	25	19	0	0	25	19
SLCT18	14	0	35	38	2	1	33	37	44	58	0	0	44	58
SLCT19	14	0	33	50	2	1	31	49	39	51	0	0	39	51

SLCT20	14	0	20	24	1	0	19	24	16	26	0	0	16	26
SLCT21	14	1	44	46	0	0	44	46	43	65	0	0	43	65
SLCT22	14	1	48	59	1	0	47	59	52	64	4	0	48	64
SLCT23	14	1	28	31	0	0	28	31	31	42	0	0	31	42
SLCT24	14	1	26	29	0	0	26	29	35	45	0	0	35	45
SLCT25	14	1	48	64	0	0	48	64	59	68	0	0	59	68
SLCT26	14	1	33	38	1	1	32	37	37	44	1	0	36	44
SLCT27	14	1	26	22	2	0	24	22	24	34	1	3	23	31
SLCT28	14	1	30	40	0	0	30	40	39	44	0	0	39	44
SLCT29	14	1	43	43	0	0	43	43	43	48	0	0	43	48
SLCT30	14	1	28	31	0	1	28	30	39	40	2	0	37	40
SLCT31	14	1	35	45	0	0	35	45	44	46	0	0	44	46
SLCT32	14	1	17	19	0	0	17	19	20	21	0	1	20	20
SLCT33	15	0	36	39	2	0	34	39	40	46	1	0	39	46
SLCT34	15	0	36	38	16	0	20	38	32	36	1	0	31	36
SLCT35	15	0	31	47	0	0	31	47	45	50	0	0	45	50
SLCT36	15	0	46	47	0	0	46	47	56	60	0	0	56	60
SLCT37	15	1	30	39	0	1	30	38	26	34	0	0	26	34
SLCT38	15	1	21	22	0	0	21	22	23	25	0	0	23	25
SLCT39	16	0	36	38	1	0	35	38	44	52	0	0	44	52
SLCT40	16	1	45	61	0	0	45	61	60	55	0	0	60	55
SLCT41	13	0	37	50	1	0	36	50	51	66	1	0	50	66
SLCT42	13	0	33	34	0	0	33	34	43	53	0	0	43	53
SLCT43	13	0	53	57	0	1	53	56	60	66	0	0	60	66
SLCT44	13	0	37	47	0	0	37	47	48	51	0	0	48	51
SLCT45	13	0	34	39	0	0	34	39	46	48	0	0	46	48

SLCT46	13	0	49	40	0	0	49	40	54	53	0	0	54	53
SLCT47	13	0	20	21	1	1	19	20	24	21	1	0	23	21
SLCT48	13	0	62	61	0	0	62	61	71	69	0	0	71	69
SLCT49	13	0	44	50	0	2	44	48	57	54	0	1	57	53
SLCT50	13	0	34	41	0	1	34	40	43	41	0	4	43	37
SLCT51	13	1	42	43	0	1	42	42	50	64	0	0	50	64
SLCT52	13	1	43	52	0	0	43	52	60	68	0	0	60	68
SLCT53	13	1	44	50	0	0	44	50	55	63	0	0	55	63
SLCT54	13	1	30	40	0	0	30	40	44	49	1	1	43	48
SLCT55	13	1	45	47	1	0	44	47	50	55	0	0	50	55
SLCT56	13	1	19	18	0	1	19	17	15	19	0	0	15	19
SLCT57	13	1	33	35	1	1	32	34	39	41	0	0	39	41
SLCT58	13	1	26	23	1	1	25	22	30	34	0	2	30	32
SLCT59	13	1	22	19	1	2	21	17	30	27	2	2	28	25
SLCT60	13	1	33	39	0	0	33	39	48	42	0	0	48	42
SLCT61	13	1	28	36	1	2	27	34	34	24	0	2	34	22
SLCT62	14	0	39	42	0	1	39	41	47	57	1	0	46	57
SLCT63	14	0	37	46	6	15	31	31	50	47	23	20	27	27
SLCT64	14	1	30	45	1	0	29	45	44	59	1	0	43	59
SLCT65	14	1	31	28	0	1	31	27	37	46	0	0	37	46
SLCT66	14	1	34	39	0	0	34	39	35	42	0	0	35	42
SLCT67	14	1	33	35	0	0	33	35	47	54	0	0	47	54
SLCT68	14	1	14	13	0	0	14	13	25	31	1	0	24	31
SLCT69	14	1	46	42	0	1	46	41	48	55	0	0	48	55
SLCT70	14	1	30	37	0	0	30	37	48	50	0	1	48	49
SLCT71	14	1	40	47	0	0	40	47	48	49	0	1	48	48

SLCT72	14	1	33	42	0	0	33	42	47	41	0	0	47	41
SLCT73	15	0	35	43	0	1	35	42	45	49	0	0	45	49
SLCT74	15	1	37	54	0	0	37	54	52	62	0	1	52	61
SLCT75	15	1	37	42	0	0	37	42	41	42	0	0	41	42
SLCT76	15	1	38	41	0	0	38	41	45	44	1	0	44	44
SLCT77	13	0	35	44	1	0	34	44	54	69	6	5	48	64
SLCT78	13	0	41	50	0	1	41	49	49	59	0	1	49	58
SLCT79	13	0	38	38	0	0	38	38	44	53	0	0	44	53
SLCT80	13	0	31	34	0	0	31	34	43	51	0	0	43	51
SLCT81	13	0	44	50	0	0	44	50	54	61	0	1	54	60
SLCT82	13	0	21	21	0	0	21	21	19	22	1	0	18	22
SLCT83	13	0	33	42	0	0	33	42	47	50	1	1	46	49
SLCT84	13	0	41	48	0	0	41	48	59	61	1	0	58	59
SLCT85	13	0	27	32	0	0	27	32	35	34	0	0	35	34
SLCT86	13	0	41	40	0	0	41	40	37	35	1	0	36	35
SLCT87	13	0	22	24	0	0	22	24	28	26	0	0	28	26
SLCT88	13	1	48	60	2	0	46	60	57	65	0	0	57	65
SLCT89	13	1	45	62	0	3	45	59	62	69	0	0	62	69
SLCT90	13	1	35	49	0	0	35	49	46	52	0	0	46	52
SLCT91	13	1	35	42	2	0	33	42	45	52	0	1	45	51
SLCT92	13	1	45	58	1	0	44	58	66	69	0	0	66	69
SLCT93	13	1	35	37	0	0	35	37	40	43	0	0	40	43
SLCT94	13	1	30	22	0	0	30	22	29	32	0	0	29	32
SLCT95	13	1	16	20	0	0	16	20	22	22	0	0	22	22
SLCT96	14	0	37	42	0	0	37	42	45	55	1	0	44	55
SLCT97	14	0	43	49	0	0	43	49	51	60	0	0	51	60

SLCT98	14	0	38	59	1	0	37	59	56	62	0	0	56	62
SLCT99	14	0	25	29	0	0	25	29	26	32	0	0	26	32
SLCT100	14	0	39	51	0	0	39	51	38	40	0	1	38	39
SLCT101	14	0	24	26	0	0	24	26	30	30	0	0	30	30
SLCT102	14	0	38	44	0	0	38	44	36	30	0	0	36	30
SLCT103	14	1	37	38	0	0	37	38	42	54	1	0	41	54
SLCT104	14	1	36	36	0	0	36	36	42	55	0	0	42	55
SLCT105	14	1	19	27	0	0	19	27	36	48	0	0	36	48
SLCT106	14	1	29	37	0	0	29	37	37	48	0	0	37	48
SLCT107	14	1	22	26	0	2	22	24	26	34	2	0	24	34
SLCT108	14	1	38	49	0	1	38	48	54	63	0	0	54	63
SLCT109	14	1	30	49	1	0	29	49	52	59	1	0	51	59
SLCT110	14	1	38	51	0	3	38	48	43	48	1	0	42	48
SLCT111	14	1	12	19	0	0	12	19	17	21	0	0	17	21
SLCT112	14	1	29	27	1	0	28	27	20	14	0	0	20	14
SLCT113	15	0	49	50	1	0	48	50	56	66	0	0	56	66
SLCT114	15	0	40	44	0	0	40	44	47	54	2	0	47	54
SLCT115	15	0	39	42	0	0	39	42	38	45	0	2	38	43
SLCT116	15	0	42	66	0	0	42	66	55	56	1	0	54	56
SLCT117	15	0	36	37	0	0	36	37	48	51	0	1	48	50
SLCT118	15	0	47	65	0	1	47	64	66	67	0	0	66	67
SLCT119	15	0	39	36	1	0	38	36	37	37	0	0	37	37
SLCT120	15	0	37	36	0	2	37	34	40	41	0	1	40	40
SLCT121	15	0	36	44	0	0	36	44	44	42	1	0	43	42
SLCT122	15	0	67	65	0	1	67	64	73	66	0	0	73	66
SLCT123	15	1	40	60	0	0	40	60	63	68	1	0	62	68

SLCT124	15	1	36	51	0	1	36	50	48	53	0	0	48	53
SLCT125	15	1	43	48	1	0	42	48	58	64	0	1	58	63
SLCT126	15	1	30	20	0	0	30	20	24	27	0	0	24	27
SLCT127	15	1	61	67	0	0	61	67	69	68	0	0	69	68
SLCT128	15	1	30	28	0	0	30	28	34	33	0	0	34	33
SLCT129	16	0	17	14	0	0	17	14	22	25	0	0	22	25
SLCT130	16	0	41	57	0	0	41	57	58	59	1	1	57	58
SLCT131	16	0	44	48	0	1	44	47	42	40	0	0	42	40
SLCT132	16	1	19	21	0	0	19	21	25	35	0	0	25	35
SLCT133	16	1	34	51	0	3	34	48	48	51	0	1	48	49
SLCT134	16	1	25	28	0	0	25	28	36	36	0	0	36	36
SLCT135	16	1	30	18	3	0	27	18	25	25	2	2	23	23
SLCT136	16	1	53	55	1	0	52	55	60	58	0	1	60	57
SLCT137	13	0	65	68	1	0	64	68	44	60	1	0	43	60
SLCT138	13	0	29	36	0	3	29	33	23	31	1	10	23	30
SLCT139	13	0	41	45	0	2	41	43	31	34	1	0	30	34
SLCT140	13	1	49	55	0	0	49	55	32	49	1	0	31	49
SLCT141	13	1	48	58	0	0	48	58	46	59	0	0	46	59
SLCT142	13	1	50	61	0	1	50	60	33	42	0	0	33	42
SLCT143	13	1	49	54	1	0	48	54	38	47	0	0	38	47
SLCT144	13	1	17	17	0	0	17	17	12	20	0	0	12	20
SLCT145	13	1	32	43	1	0	31	43	27	35	0	1	27	34
SLCT146	13	1	47	65	1	1	46	64	33	39	1	1	32	38
SLCT147	13	1	23	35	0	5	23	30	19	21	4	1	15	20
SLCT148	13	1	22	25	1	0	21	25	23	28	0	0	23	28
SLCT149	13	1	43	42	1	2	42	40	42	36	10	0	32	36

SLCT150	13	1	27	27	0	0	27	27	23	25	0	0	23	25
SLCT151	13	1	15	22	0	0	15	22	15	16	0	0	15	16
SLCT152	13	1	30	26	1	3	29	23	27	26	4	2	23	24
SLCT153	13	1	27	36	0	1	27	35	27	27	1	1	26	26
SLCT154	13	1	41	44	0	1	41	43	33	32	0	0	33	32
SLCT155	13	1	43	51	0	1	43	50	38	34	2	0	36	34
SLCT156	13	1	24	28	0	0	24	28	28	28	0	2	28	26
SLCT157	13	1	30	31	0	1	30	30	30	25	0	0	30	25
SLCT158	14	0	53	58	0	5	53	53	44	49	1	0	43	49
SLCT159	14	0	42	66	0	0	42	66	50	56	0	1	50	55
SLCT160	14	0	47	58	2	0	45	58	42	46	0	0	42	46
SLCT161	14	1	50	54	0	0	50	54	31	46	1	0	30	46
SLCT162	14	1	35	48	0	0	35	48	28	43	0	1	28	42
SLCT163	14	1	69	67	0	1	69	66	33	41	8	3	25	38
SLCT164	14	1	34	46	1	1	33	45	26	32	1	1	25	31
SLCT165	14	1	26	33	1	2	25	31	23	28	1	0	22	28
SLCT166	14	1	29	34	0	0	29	34	23	27	0	0	23	27
SLCT167	14	1	39	49	0	0	39	49	34	33	0	0	34	33
SLCT168	15	0	39	45	0	2	39	43	32	43	0	1	32	42
SLCT169	15	0	51	58	0	2	51	56	45	51	0	0	45	51
SLCT170	15	0	46	44	0	1	46	43	47	47	2	0	45	47
SLCT171	15	1	50	53	0	1	50	52	48	53	0	0	48	53
SLCT172	15	1	44	35	2	0	42	35	33	40	0	3	33	37
SLCT173	15	1	57	57	0	0	57	57	47	48	0	0	47	48
SLCT174	15	1	39	46	0	0	39	46	40	34	0	0	40	34
SLCT175	16	1	33	33	0	0	33	33	22	39	0	0	22	39

SLCT176	16	1	44	52	0	0	44	52	35	43	0	0	35	43
SLCT177	16	1	28	39	1	9	27	30	26	31	0	4	26	27
SLCT178	13	0	43	45	0	0	43	45	44	45	2	0	42	45
SLCT179	13	0	51	50	2	0	49	50	45	49	1	2	44	47
SLCT180	13	0	45	45	0	0	45	45	33	39	0	4	33	35
SLCT181	13	1	35	53	0	1	35	52	39	48	3	0	36	48
SLCT182	13	1	56	70	0	1	56	69	48	51	1	0	47	51
SLCT183	13	1	46	51	3	1	43	50	33	38	0	1	33	37
SLCT184	13	1	43	42	0	1	43	41	41	42	2	0	39	42
SLCT185	13	1	38	45	0	0	38	45	31	31	1	0	30	31
SLCT186	13	1	33	53	5	10	28	43	30	30	0	0	30	30
SLCT187	13	1	40	40	1	1	39	39	30	30	0	0	30	30
SLCT188	13	1	39	41	2	2	37	39	33	30	3	1	30	29
SLCT189	13	1	54	62	0	0	54	62	43	41	0	0	43	41
SLCT190	13	1	49	57	0	0	49	57	36	34	0	0	36	34
SLCT191	13	1	48	54	1	1	47	53	35	30	0	1	35	29
SLCT192	13	1	23	27	0	0	23	27	22	14	0	0	22	14
SLCT193	13	1	18	42	0	0	18	42	30	21	0	1	30	20
SLCT194	14	0	36	42	0	0	36	42	29	38	0	0	29	38
SLCT195	14	0	23	26	2	3	21	23	20	19	1	0	19	19
SLCT196	14	0	53	50	1	0	52	50	46	35	0	0	46	35
SLCT197	14	1	37	48	0	2	37	46	21	32	0	1	21	31
SLCT198	14	1	27	28	0	1	27	27	20	29	0	0	20	29
SLCT199	14	1	49	50	0	1	49	49	38	37	1	1	37	36
SLCT200	15	0	24	40	0	1	24	39	15	23	0	1	15	22
SLCT201	15	0	44	58	1	0	43	58	31	34	0	0	31	34

SLCT202	15	0	41	50	0	0	41	50	33	26	0	0	33	26
SLCT203	15	0	52	58	0	0	52	58	47	36	1	0	46	36
SLCT204	15	1	40	42	0	0	40	42	36	28	0	0	36	28
SLCT205	16	1	56	62	0	0	56	62	49	59	0	1	49	58
SLCT206	16	1	63	66	0	0	63	66	58	63	5	4	53	59
SLCT207	13	0	34	54	0	0	34	54	21	31	0	0	21	31
SLCT208	13	0	57	68	1	0	56	68	37	48	1	2	36	46
SLCT209	13	0	39	51	0	2	39	49	32	37	4	0	28	37
SLCT210	13	0	37	54	1	2	36	52	29	40	0	3	29	37
SLCT211	13	0	54	68	0	0	54	68	57	61	3	0	54	61
SLCT212	13	0	45	46	3	5	43	41	30	39	0	3	30	36
SLCT213	13	0	42	52	0	0	42	52	30	32	0	0	30	32
SLCT214	13	0	27	26	1	0	26	26	25	23	1	0	24	23
SLCT215	13	0	72	70	1	0	72	69	70	56	2	2	68	54
SLCT216	13	1	68	66	0	0	68	66	46	61	0	0	46	61
SLCT217	13	1	51	69	2	2	49	67	30	38	0	0	30	38
SLCT218	13	1	41	48	0	0	41	48	27	33	0	0	27	33
SLCT219	13	1	42	37	0	0	42	37	36	41	1	0	35	41
SLCT220	13	1	44	49	2	2	42	47	37	42	1	1	36	41
SLCT221	13	1	35	52	0	0	35	52	30	30	3	0	27	30
SLCT222	13	1	36	38	0	0	36	38	32	34	0	0	32	34
SLCT223	13	1	21	27	0	0	21	27	27	26	1	1	26	25
SLCT224	13	1	42	45	1	0	41	45	38	34	0	0	38	34
SLCT225	13	1	26	21	0	0	26	21	24	20	0	0	24	20
SLCT226	13	1	27	45	0	0	27	45	25	20	0	0	25	20
SLCT227	14	0	55	60	1	3	54	54	36	57	2	6	34	51

SLCT228	14	0	52	66	0	0	52	66	42	53	1	0	41	53
SLCT229	14	0	57	65	1	3	56	62	37	50	1	4	36	46
SLCT230	14	0	56	64	1	0	55	64	45	54	0	0	45	54
SLCT231	14	0	52	56	0	0	52	56	49	55	0	0	49	55
SLCT232	14	0	37	38	1	0	36	38	24	28	0	0	24	28
SLCT233	14	1	40	60	2	1	38	59	25	46	1	0	24	46
SLCT234	14	1	70	67	1	0	69	67	52	71	1	2	51	69
SLCT235	14	1	57	65	0	1	57	64	44	61	0	0	44	61
SLCT236	14	1	61	60	0	0	61	60	43	54	0	0	43	54
SLCT237	14	1	49	55	1	0	48	55	37	45	0	0	37	45
SLCT238	14	1	37	48	0	0	37	48	33	38	0	0	33	38
SLCT239	14	1	46	38	0	0	46	38	26	33	0	2	26	31
SLCT240	14	1	51	54	1	0	50	54	31	36	0	1	31	35
SLCT241	14	1	31	38	0	0	31	38	26	24	2	2	24	22
SLCT242	14	1	39	45	2	0	37	45	32	25	0	0	32	25
SLCT243	14	1	60	60	0	1	60	59	53	45	1	0	52	45
SLCT244	14	1	51	49	2	0	49	49	50	38	0	0	50	38
SLCT245	15	0	70	68	0	0	70	68	40	51	0	0	40	51
SLCT246	15	0	39	50	2	1	37	49	30	38	1	1	29	37
SLCT247	15	0	54	63	0	0	54	63	52	56	0	0	52	56
SLCT248	15	1	53	62	0	0	53	62	27	42	0	0	27	42
SLCT249	15	1	61	60	0	1	61	59	42	57	0	0	42	57
SLCT250	15	1	59	66	0	0	59	66	43	57	0	1	43	56
SLCT251	15	1	55	61	0	1	55	60	43	56	0	0	43	56
SLCT252	15	1	68	71	0	0	68	71	52	63	0	0	52	63
SLCT253	15	1	72	69	0	0	72	69	49	57	0	0	49	57

SLCT254	15	1	65	71	0	2	65	69	54	63	0	2	54	61
SLCT255	15	1	36	36	0	0	36	36	15	22	0	0	15	22
SLCT256	15	1	56	67	0	1	56	66	46	52	1	3	45	49
SLCT257	15	1	60	57	0	0	60	57	58	58	0	0	58	58
SLCT258	15	1	37	57	0	0	37	57	57	50	0	0	57	50
SLCT259	16	0	14	12	0	1	14	12	8	15	0	0	8	15
SLCT260	16	0	70	66	2	0	68	66	56	57	2	0	54	57
SLCT261	16	0	63	67	0	0	63	67	57	59	0	0	57	59
SLCT262	16	0	44	38	0	0	44	38	31	32	0	0	31	32
SLCT263	16	0	70	61	2	0	68	61	66	66	0	1	66	65
SLCT264	16	1	48	54	2	0	46	54	40	53	0	0	40	53
SLCT265	16	1	57	64	0	0	57	64	39	50	1	1	38	49
SLCT266	16	1	50	59	0	0	50	59	39	49	1	2	38	47

Table 5.3.2: Total score, score for wrong substitution, and net score of digit letter substitution test administered in Pre and Post states of cyclic meditation session and supine rest session.

			Cyclic Meditation						Supine Rest					
SLCODE	AGE	SEX	Pre Total Score	Post Total Score	Pre Wrong Score	Post Wrong Score	Pre Net Score	Post Net Score	Pre Total Score	Post Total Score	Pre Wrong Score	Post Wrong Score	Pre Net Score	Post Net Score
DLST1	14	0	70	77	1	0	69	77	40	57	0	0	40	57
DLST2	16	1	54	55	0	0	54	55	36	55	0	0	36	55
DLST3	14	1	70	72	1	0	69	72	43	48	0	0	43	48
DLST4	14	1	42	50	0	5	42	45	33	44	0	3	33	41
DLST5	13	1	72	75	0	0	72	75	40	60	0	0	40	60
DLST6	14	1	53	54	0	0	53	54	44	48	0	0	44	48
DLST7	13	1	49	50	0	3	49	47	36	43	0	2	36	41
DLST8	16	1	70	84	1	2	69	82	49	61	0	0	49	61
DLST9	13	1	72	60	0	0	72	60	39	55	0	0	39	55
DLST10	14	1	58	62	0	0	58	62	43	60	0	0	43	60
DLST11	13	1	49	54	0	0	49	54	36	48	0	0	36	48
DLST12	15	1	70	72	0	0	70	72	44	63	0	0	44	63
DLST13	13	1	59	60	0	0	59	60	33	53	0	0	33	53
DLST14	15	0	75	69	0	0	75	69	48	64	0	0	48	64
DLST15	14	0	69	65	0	0	69	65	51	61	0	0	51	61
DLST16	13	1	53	50	0	0	53	50	36	40	0	0	36	40
DLST17	13	1	51	54	0	0	51	54	34	49	0	0	34	49
DLST18	13	1	37	36	0	0	37	36	36	39	0	0	36	39
DLST19	13	0	58	68	0	0	58	68	55	63	0	0	55	63
DLST20	15	1	57	60	1	0	56	60	61	65	0	0	61	65
DLST21	16	1	40	38	0	0	40	38	44	43	0	0	44	43
DLST22	15	1	71	77	1	0	40	77	57	65	0	0	57	65
DLST23	15	1	63	66	0	0	63	66	57	70	0	0	57	70

DLST24	13	1	60	56	0	0	60	56	59	57	0	0	59	57
DLST25	14	1	53	58	0	0	53	58	57	58	0	1	57	57
DLST26	13	1	52	58	0	1	51	58	48	53	0	0	48	53
DLST27	13	1	45	42	0	0	45	42	57	42	0	0	57	42
DLST28	14	1	60	61	0	0	60	61	57	63	0	0	57	63
DLST29	13	1	62	68	0	0	62	68	55	63	0	0	55	63
DLST30	13	1	52	59	0	0	52	59	51	50	0	0	51	50
DLST31	13	1	71	67	1	0	70	67	65	69	0	0	65	69
DLST32	15	0	62	68	0	0	62	68	67	63	0	0	67	63
DLST33	14	0	57	61	0	0	57	61	58	59	0	0	58	59
DLST34	13	0	65	58	0	0	65	58	60	61	0	0	60	61
DLST35	15	0	65	59	0	0	65	59	75	60	0	0	75	60
DLST36	13	0	44	33	1	2	43	31	41	39	0	0	41	39
DLST37	16	0	54	56	0	0	54	56	58	58	0	0	58	58
DLST38	13	0	54	57	0	0	54	57	58	61	0	0	58	61
DLST39	15	0	58	56	0	0	58	56	56	54	0	0	56	54
DLST40	13	0	69	56	0	1	69	55	73	57	0	1	73	56
DLST41	15	0	79	76	0	0	79	76	80	89	3	0	77	89
DLST42	14	1	56	52	0	0	56	52	60	56	0	0	60	56
DLST43	14	1	56	60	0	0	56	60	53	63	0	0	53	63
DLST44	14	1	44	45	0	0	44	45	37	44	1	0	36	44
DLST45	14	1	54	58	0	1	54	57	62	62	0	0	62	62
DLST46	13	1	48	47	0	0	48	47	44	48	0	0	44	48
DLST47	14	1	64	57	0	0	64	57	60	66	0	0	60	66
DLST48	14	1	67	56	0	4	67	52	72	74	0	0	72	74
DLST49	13	1	60	51	0	1	60	50	59	55	0	10	59	54
DLST50	13	1	46	47	0	0	46	47	55	52	0	0	55	52
DLST51	13	1	40	45	0	4	40	41	46	52	2	0	44	52

DLST52	14	1	54	55	0	1	54	54	59	48	0	2	59	46
DLST53	14	1	63	66	0	0	63	66	64	60	0	0	64	60
DLST54	13	1	40	43	0	0	40	43	50	41	0	0	50	41
DLST55	15	0	57	66	0	0	57	66	59	67	0	0	59	67
DLST56	13	1	67	74	0	0	67	74	48	72	0	0	48	72
DLST57	13	1	61	69	0	1	61	68	48	66	0	0	48	66
DLST58	13	0	61	53	0	0	61	53	34	57	0	0	34	57
DLST59	13	1	53	67	0	0	53	67	42	69	0	0	42	69
DLST60	14	0	75	89	0	0	75	89	59	86	0	0	59	86
DLST61	13	0	51	56	0	0	51	56	34	57	0	0	34	57
DLST62	13	1	47	57	0	0	47	57	36	56	0	1	36	55
DLST63	15	1	48	60	0	0	48	60	38	60	0	0	38	60
DLST64	15	1	62	50	0	1	62	49	44	54	0	3	44	51
DLST65	13	1	67	68	0	0	67	68	53	60	0	2	53	58
DLST66	15	0	65	77	0	0	65	77	48	72	0	0	48	72
DLST67	14	1	58	67	0	0	58	67	42	70	0	0	42	70
DLST68	13	0	60	72	0	0	60	72	46	71	0	0	46	71
DLST69	14	0	44	51	1	0	43	51	33	46	0	0	33	46
DLST70	13	1	54	60	0	0	54	60	59	86	1	0	58	86
DLST71	14	1	66	64	0	0	66	64	45	62	0	0	45	62
DLST72	13	1	72	66	0	0	72	66	70	92	0	2	70	90
DLST73	15	0	80	81	0	0	80	81	62	88	0	0	62	88
DLST74	15	0	61	61	0	0	61	61	55	72	0	0	55	72
DLST75	15	1	56	52	0	0	56	52	48	72	0	0	48	72
DLST76	13	1	72	73	0	0	72	73	63	85	0	0	63	85
DLST77	13	1	60	55	0	0	60	55	55	78	0	0	55	78
DLST78	13	1	51	39	0	0	51	39	35	52	0	0	35	52
DLST79	13	1	59	64	0	0	59	64	48	74	0	0	48	74

DLST80	14	0	60	57	0	0	60	57	52	75	0	0	52	75
DLST81	13	0	55	60	0	0	55	60	52	74	0	1	52	73
DLST82	14	0	67	56	0	0	67	56	64	79	0	0	64	79
DLST83	13	1	70	68	0	0	70	68	61	79	0	0	61	79
DLST84	15	0	72	69	0	0	72	69	66	90	0	1	66	89
DLST85	13	1	40	36	0	0	40	36	32	43	0	0	32	43
DLST86	13	1	56	50	0	0	56	50	49	65	0	0	49	65
DLST87	16	1	60	63	0	0	60	63	63	63	0	0	63	63
DLST88	16	1	91	78	1	0	90	78	81	85	0	0	81	85
DLST89	14	1	71	79	0	1	71	78	59	71	0	0	59	71
DLST90	13	0	68	77	0	0	68	77	67	74	0	0	67	74
DLST91	13	1	64	65	0	0	64	65	52	54	0	0	52	54
DLST92	15	0	62	71	0	0	62	71	61	63	0	0	61	63
DLST93	14	1	50	54	0	0	50	54	49	46	0	0	49	46
DLST94	13	0	53	52	0	0	53	52	48	51	0	1	48	50
DLST95	14	1	44	53	0	0	44	53	35	41	1	0	34	41
DLST96	14	0	43	47	0	0	43	47	39	41	0	0	39	41
DLST97	13	1	45	47	1	0	44	47	45	48	0	0	45	48
DLST98	14	1	51	48	0	0	51	48	50	51	0	0	50	51
DLST99	13	0	53	72	0	0	53	72	51	48	1	1	50	47
DLST100	15	1	48	72	0	0	48	72	52	43	0	0	52	43
DLST101	13	1	60	90	0	0	60	90	60	53	0	0	60	53
DLST102	14	1	73	96	0	0	73	96	74	66	0	0	74	66
DLST103	14	1	79	56	2	0	77	56	65	53	0	0	65	53
DLST104	15	1	57	76	0	0	57	76	60	50	0	0	60	50
DLST105	13	1	57	79	0	0	57	79	58	50	0	0	58	50
DLST106	13	1	54	78	0	0	54	78	65	54	0	0	65	54
DLST107	13	1	56	72	0	0	56	72	52	46	0	0	52	46

DLST108	14	1	58	83	0	0	58	83	68	43	1	1	67	42
DLST109	13	1	51	67	1	2	50	65	52	49	2	6	50	43
DLST110	14	1	53	83	0	2	53	81	60	57	0	0	60	57
DLST111	13	1	64	88	0	0	64	88	68	61	0	1	68	60
DLST112	13	0	78	96	0	0	78	96	84	74	0	3	84	71
DLST113	13	0	58	84	0	0	58	84	65	60	0	2	65	58
DLST114	13	0	71	93	0	1	71	92	74	65	0	1	74	64
DLST115	13	0	60	80	0	1	60	79	63	59	1	0	62	59
DLST116	13	0	61	96	0	1	61	95	72	65	0	0	72	65
DLST117	13	0	45	66	1	1	44	65	45	44	0	0	45	44
DLST118	14	0	56	74	1	2	55	54	60	42	0	3	60	39
DLST119	14	1	70	72	0	0	70	72	80	74	0	0	80	74
DLST120	14	1	62	61	0	0	62	61	65	70	0	0	65	70
DLST121	13	1	67	74	0	2	67	72	77	80	0	0	77	80
DLST122	14	1	62	63	1	0	61	63	65	64	0	0	65	64
DLST123	14	1	52	57	0	1	52	53	64	60	4	5	60	55
DLST124	15	0	52	53	0	0	52	53	54	55	0	0	54	55
DLST125	13	1	53	54	0	0	53	54	59	53	0	0	59	53
DLST126	13	1	60	58	0	0	60	58	81	72	0	0	81	72
DLST127	14	1	54	64	0	0	54	64	63	69	0	0	63	69
DLST128	15	1	60	65	2	0	58	65	67	60	0	0	67	60
DLST129	13	1	60	65	0	0	60	65	60	63	0	0	60	63
DLST130	13	1	60	65	0	1	60	64	65	60	0	1	65	59
DLST131	13	0	66	59	0	0	66	59	46	61	1	0	45	61
DLST132	14	0	60	56	0	0	60	56	58	62	0	0	58	62
DLST133	13	0	53	57	0	0	53	57	60	60	0	0	60	60
DLST134	13	0	73	73	0	0	73	73	63	65	2	0	61	65
DLST135	13	1	57	43	0	0	57	43	54	51	0	1	54	51

DLST136	13	0	46	41	0	0	46	41	44	42	0	0	44	42
DLST137	15	0	58	60	0	0	58	60	71	62	0	0	71	62
DLST138	15	0	71	60	0	0	71	60	75	77	0	0	75	77
DLST139	15	0	81	63	0	0	81	63	96	72	0	0	96	72
DLST140	13	0	65	52	0	0	65	52	57	50	0	0	57	50
DLST141	13	0	63	53	0	0	63	53	59	57	0	0	59	57
DLST142	15	0	70	54	0	0	70	54	66	57	0	0	66	57
DLST143	14	0	52	44	0	0	52	44	51	55	0	0	51	55
DLST144	13	0	64	60	0	0	64	60	70	69	0	0	70	69
DLST145	14	0	38	30	0	0	38	30	37	51	0	0	37	51
DLST146	15	0	60	51	0	0	60	51	60	55	0	0	60	55
DLST147	16	0	76	61	0	0	76	61	74	80	0	1	79	76
DLST148	16	0	34	36	0	0	34	36	48	48	0	0	48	48
DLST149	14	0	37	36	0	0	37	36	50	48	0	0	50	48
DLST150	14	0	56	48	0	0	56	48	66	60	0	0	66	60
DLST151	15	0	44	39	0	0	44	39	52	50	0	0	52	50
DLST152	13	0	57	52	0	0	57	52	59	60	0	1	59	59
DLST153	13	0	58	52	0	0	58	52	57	56	0	0	57	56
DLST154	15	0	63	60	0	0	63	60	76	72	0	0	76	72
DLST155	16	0	61	57	0	0	61	57	70	70	0	0	70	70
DLST156	14	0	49	46	0	0	49	46	53	56	0	0	53	56
DLST157	16	1	44	48	0	0	44	48	48	48	0	0	48	48
DLST158	16	1	86	52	0	0	86	52	81	77	2	2	79	75
DLST159	14	1	53	39	0	0	53	39	48	53	0	0	48	53
DLST160	14	1	45	43	0	0	45	43	57	57	0	0	57	57
DLST161	13	1	48	42	0	0	48	42	45	61	0	0	45	61
DLST162	16	1	57	48	0	0	57	48	52	55	2	0	50	55
DLST163	15	1	42	41	0	0	42	41	53	48	0	0	53	48

DLST164	14	1	54	52	0	0	54	52	59	60	0	0	59	60
DLST165	14	1	59	52	0	0	59	52	54	56	0	0	54	56
DLST166	14	1	47	49	0	1	47	48	61	62	0	0	61	62
DLST167	15	1	54	48	0	0	54	48	53	46	0	0	53	46
DLST168	14	1	31	30	0	0	31	30	36	36	0	0	36	36
DLST169	16	1	82	73	0	0	82	73	79	74	0	0	79	74
DLST170	15	1	94	91	0	0	94	91	84	84	0	0	84	84
DLST171	15	0	72	75	0	0	72	75	66	72	0	0	66	72
DLST172	13	0	72	61	0	0	72	61	67	60	0	0	67	60
DLST173	14	0	65	72	0	0	65	72	60	61	0	0	60	61
DLST174	13	0	64	72	0	0	64	72	58	60	0	0	58	60
DLST175	14	0	75	88	0	0	75	88	74	75	0	0	74	75
DLST176	13	0	62	68	0	0	62	68	61	60	1	0	60	60
DLST177	13	0	61	60	0	0	61	60	57	52	0	0	57	52
DLST178	14	1	76	64	0	0	76	64	60	65	0	0	60	65
DLST179	13	1	54	62	0	0	53	62	52	55	0	1	52	54
DLST180	14	1	86	81	0	0	86	81	58	68	1	0	57	68
DLST181	14	1	60	53	0	0	60	53	47	48	0	0	47	48
DLST182	13	1	72	60	0	0	72	60	60	60	0	0	60	60
DLST183	15	1	52	49	0	0	52	49	46	50	0	0	46	50
DLST184	15	1	80	73	0	0	80	73	61	78	0	0	61	78
DLST185	15	1	87	94	0	0	87	94	70	72	0	0	70	72
DLST186	13	1	52	45	0	0	52	45	45	48	0	0	45	48
DLST187	14	1	61	60	0	0	61	60	48	52	0	0	48	52
DLST188	14	1	68	70	0	0	68	70	78	66	0	0	78	66
DLST189	16	1	75	72	0	0	75	72	58	65	0	0	58	65
DLST190	13	1	52	54	0	0	52	54	48	60	0	0	48	60
DLST191	15	1	84	82	0	1	84	81	66	69	0	0	66	69

DLST192	16	0	26	36	0	0	26	36	32	28	0	0	32	28
DLST193	13	0	76	94	0	0	76	94	54	72	0	0	54	72
DLST194	14	1	63	67	0	0	63	67	54	60	0	0	54	60
DLST195	15	0	62	61	0	0	62	61	72	71	0	0	72	71
DLST196	13	0	67	72	0	0	67	72	72	62	0	0	72	62
DLST197	13	0	63	71	0	0	63	71	73	75	0	0	73	75
DLST198	15	0	69	72	0	0	69	72	72	80	0	0	72	80
DLST199	13	0	69	51	0	0	69	51	51	77	0	0	51	77
DLST200	14	0	48	55	0	0	48	55	49	62	0	0	49	62
DLST201	13	0	56	55	0	0	56	55	60	60	0	0	60	60
DLST202	14	0	63	72	0	0	63	72	68	72	0	0	68	72
DLST203	13	0	59	56	0	0	59	56	62	61	0	0	62	61
DLST204	15	0	61	62	0	0	61	62	62	54	0	0	62	54
DLST205	15	1	62	68	0	0	62	68	63	65	0	1	63	64
DLST206	14	1	60	72	0	0	60	72	64	68	0	0	64	68
DLST207	15	1	65	69	0	0	65	69	72	72	0	0	72	72
DLST208	13	1	62	73	0	0	62	73	72	74	0	0	72	74
DLST209	14	1	48	64	0	0	48	64	52	56	0	0	52	56
DLST210	13	1	73	78	0	0	73	78	78	85	0	0	78	85
DLST211	13	1	55	61	0	7	55	54	70	66	1	9	69	57
DLST212	14	1	53	63	0	0	53	63	66	68	0	0	66	68
DLST213	13	1	71	72	0	0	71	72	78	84	0	0	78	84
DLST214	14	1	59	62	0	0	59	62	68	65	1	0	67	65
DLST215	13	1	37	44	0	0	37	44	44	39	1	1	43	38
DLST216	16	1	57	80	0	2	57	78	69	75	0	0	69	75
DLST217	15	1	66	81	0	0	66	81	74	90	0	2	74	88
DLST218	16	1	59	61	0	0	59	61	57	67	0	0	57	67
DLST219	13	1	56	55	0	0	56	55	54	67	0	0	54	67

DLST220	15	1	54	55	0	0	54	55	57	55	0	0	57	55
DLST221	15	1	72	72	0	0	72	72	63	65	0	0	63	65
DLST222	16	0	65	77	0	0	65	77	96	96	0	0	96	96
DLST223	14	0	47	60	0	0	47	60	44	49	0	0	44	49
DLST224	16	0	70	96	0	0	70	96	72	83	0	0	72	83
DLST225	16	0	76	84	0	0	76	84	79	96	0	0	79	96
DLST226	16	0	62	72	0	0	62	72	57	62	0	0	57	62
DLST227	14	0	59	52	0	0	59	52	56	53	0	0	56	53
DLST228	14	0	65	69	0	2	65	67	65	62	0	0	65	62
DLST229	13	0	57	55	0	0	57	55	48	55	0	0	48	55
DLST230	15	0	71	72	0	0	71	72	67	62	0	0	67	62
DLST231	13	1	52	67	0	0	52	67	48	57	0	0	48	57
DLST232	13	1	59	61	0	0	59	61	51	55	0	0	51	55
DLST233	14	1	76	69	0	1	76	68	64	48	0	0	64	48
DLST234	14	1	71	69	0	0	71	69	62	61	0	0	62	61
DLST235	15	1	79	80	0	1	79	79	71	69	0	0	71	69
DLST236	14	1	54	55	0	0	54	55	49	45	0	0	49	45
DLST237	14	1	65	75	0	1	65	74	53	64	0	0	53	64
DLST238	14	1	61	72	0	0	61	72	62	65	0	0	62	65
DLST239	13	1	58	64	1	0	57	64	48	56	0	0	48	56
DLST240	15	1	67	69	0	1	67	68	82	66	0	0	82	66
DLST241	13	0	67	70	0	0	67	70	59	64	0	0	59	64
DLST242	14	0	72	74	0	0	72	74	64	65	0	0	64	65
DLST243	13	0	43	48	0	0	43	48	41	44	0	0	41	44
DLST244	13	1	61	64	0	0	61	64	52	73	0	3	52	70
DLST245	14	1	62	70	0	0	62	70	46	60	0	0	46	60
DLST246	13	1	57	58	0	0	57	58	48	60	0	0	48	60
DLST247	16	1	66	71	0	0	66	71	64	64	0	0	64	64

DLST248	13	1	63	60	0	0	63	60	60	60	0	0	60	60
DLST249	13	1	50	56	0	0	50	56	56	49	0	0	56	49

Plate 4.2.4.A. Each step of Cyclic Meditation practice

	
Tādāsana	**Ardhakaticakrāsana**
	
Ardhakaticakrāsana	**Ardhacakrāsana**
	
Pādahastāsana	**Savasana**

Plate 4.2.4.B. Group practice of Cyclic Meditation

	
Pādahastāsana	**Pādahastāsana**
	
Savasana	**Savasana**
	
Savasana	**Savasana**

Publications

1. Balaram Pradhan, HR Nagendra. Normative data for the letter-cancellation task in school children. International Journal of Yoga, 2008, 1, (2):72-75.
2. Balaram Pradhan, HR Nagendra. Effect of yoga relaxation techniques on performance of digit-letter substitution task by teenagers. International Journal of Yoga, 2009, 2, 1: 30-34.
3. Balaram Pradhan, HR Nagendra. Normative data for the digit-letter substitution task in school children International Journal of Yoga, 2009, 2, (2): 69-72.
4. Balaram Pradhan, HR Nagendra Immediate effect of two yoga-based relaxation techniques on attention in children International Journal of Yoga, 2010, 3(2): 67-69.