CHAPTER-6

AN OVERVIEW OF EXPERIMENTS DONE ON DHĀRANA AND DHYĀNA BY ANVESHANA OF SVYASA UNIVERSITY

6.0 INTRODUCTION

The Yoga Sutras is a classical text that serves as the cornerstone for the philosophy and practice of Yoga. Traditionally attributed to the sage Patanjali, the compilation of the Yoga Sutras is believed to have occurred around 400 CE, although its exact origin remains a subject of scholarly debate. The text is composed of 196 aphorisms or sutras, which succinctly outline the fundamental principles and practices of Yoga.

The Yoga Sutras are organized into four chapters, known as padas, each addressing distinct aspects of Yoga:

Samādhi Pada: This chapter primarily delves into the concept of Samādhi, which represents Yoga's ultimate aim is to achieve total absorption and oneness with the almighty. It expounds on the nature of consciousness and elucidates the path to attain meditative absorption.

Sadhana Pada: “Focusing on the practical aspects of Yoga, this chapter outlines the Ashtanga (eight limbs) of Yoga, comprising Yama (restraints), Niyama (observances), Asana (postures), Pranayama (breath control), Pratyahara (withdrawal of the senses), Dhāraṇā (concentration), Dhyāna (meditation), and Samādhi (absorption)”.

Vibhuti Pada: The third chapter explores the powers and attainments known as siddhis that may arise through advanced Yoga practices. Patanjali emphasizes that while these siddhis may manifest, They shouldn't divert attention from Samādhi's main objective..

Kaivalya Pada: This chapter, which finishes the text, talks about the state of liberation, or kaivalya, in which each person's soul realises its true nature and breaks free from the cycle of birth and death. It highlights the idea of separation or seclusion from the physical world.

The Yoga Sutras are expressed in a succinct and aphoristic style, rendering them open to interpretation, and they necessitate commentaries and teachings from experienced yogis and scholars. The literature is still studied and respected by researchers and practitioners of yoga worldwide, and it is considered a core scripture for understanding the theory and practice of yoga.

Sage Patañjali outlines the eight limbs of Yoga, “which are Yama, Niyama, Āsana, Prāṇāyāma, Pratyāhāra, Dhāraṇa, Dhyāna, and Samādhi”. “(Yama-niyama-āsana-prāṇayama-pratyāhāra-dhāraṇa-dhyāna-samādhayo-aṣṭavangani” (PYS II.29). “Yama and Niyama consist of five principles each and serve as physical and moral restraints that a spiritual seeker should practice before delving into serious meditation”.

“The eight limbs of Yoga, as expounded by Sage Patañjali, provide a comprehensive framework for the practice and spiritual evolution of a yogi”. The Yama and Niyama limbs focus on ethical guidelines and moral principles that lay the foundation for a virtuous and disciplined life. “They include principles like non-violence (ahimsa), truthfulness (satya), non-stealing (asteya), moderation (brahmacharya), and non-possessiveness (aparigraha) in Yama, and cleanliness (saucha), contentment (santosha), discipline (tapas), self-study (svadhyaya), and surrender to the divine (ishvarapranidhana) in Niyama”.

Before a spiritual seeker embarks on serious meditation practices, cultivating these ethical restraints is essential as they purify the mind and create a conducive environment for inner growth. Yama and Niyama provide the necessary groundwork to progress through the subsequent limbs of Yoga, leading to higher states of consciousness and self-realization.

“The first five limbs of Yoga are referred to as Bahiraṅga Yoga, while the last three limbs are called Āṅtaraṅga Yoga. Āsana, the comfortable sitting posture, is characterized by the principle” "Sthirasukham āsanam" (Yoga Sutras II.46), which means that the posture should be steady and comfortable. “Prāṇāyāma involves the control of breath, encompassing inhalation and exhalation of psychic breath (Prachardana vidāraṇābhyam va prāṇasya |). Pratyāhāra denotes the withdrawal of senses from external stimuli”.

“Dhāraṇa is the practice of holding the mind onto a specific object or focal point” (Deśabandha-cittasya dhāraṇa, Yoga Sutras III.1). “Dhyāna, which follows Dhāraṇa, is characterized by an unbroken flow of knowledge directed towards that chosen object” (PYS III.2). “When Dhāraṇa intensifies, it transforms into Dhyāna. During this meditative process, one should initially concentrate on gross objects, gradually moving towards subtle objects, until eventually transcending all objects and entering into an objectless state”. This deep concentration grants the practitioner control over the mind and may lead to the development of miraculous powers.

As Swami Vivekananda aptly remarks, "the glory of the soul, undisturbed by the distractions of the mind or motions of the body, will shine in its full effulgence" (Ibid). “Meditation, or Dhyāna, involves mental training aimed at increasing awareness of one's mental processes and establishing mental stability”. “Regular meditation practice has been observed to produce definite changes in practical attention and cognition over time” (Brown P P). Practitioners of meditation (Dhyāna) aim to reach a particular state of consciousness during which internal focus and profound relaxation coexist.

In conclusion, the Yoga Sutras elucidate the progressive path of Yoga, consisting of Bahiraṅga Yoga (the external aspects) and Āṅtaraṅga Yoga (the internal aspects). “Through the practice of Āsana, Prāṇāyāma, Pratyāhāra, Dhāraṇa, and Dhyāna, seekers can attain heightened mental focus, stability, and spiritual realization”.

The researchers, including Dr. R Nagarathna, Dr. Shirley Telles, Dr. N K Manjunatha Sharma, Dr. Deepeshwar Singh, and others, conducted studies at the SVYASA research laboratory called Anveṣaṇa under the guidance of Yoga Scientist Dr. H R Nagendra. They conducted investigations on cancalatā and ekāgratā in addition to Dhāraṇa and Dhyāna. Since the primary goal was to assess how well the cochlear nerve's peripheral information processing functions in conjunction with cortices, it did not interfere with the practitioner's practice of meditation.

After confirming the amplitude of these neurons, the researchers especially looked at the evoked potentials covering the brainstem, mid-latency, and long-latency responses. The data underwent statistical analysis, encompassing sessions such as random thought, non-meditative concentrated thought, meditative focusing, and states of meditation. These assessments, which provided objective physiological parameters, were carried out by the researchers before to, during, and following the brainstem auditory evoked potentials.

During dhāraṇa, ekāgratā, and cancalatā sessions, the recorded data demonstrated a considerable increase in brain activity, indicating heightened auditory information processing during these mental states. However, not much change was observed in brain activity during dhyāna practices, suggesting that the brain was relatively less active during deep meditative absorption.

These findings shed light on the neural correlates of different mental states during meditation, providing valuable insights into the effects of Dhāraṇa and Dhyāna on auditory

information processing. The SVYASA research laboratory's investigations broaden our understanding of the physiological and neurological elements of meditation techniques.

“The results also denoted that dhyāna practice does not delay the auditory sensory transmission at brainstem levels but delay was shown at auditory information transmission and also at primary auditory courses” (Singh Deepeshwar and Shirley Telles 1). “There were peak amplitudes of p1, p2 waves during cancalatā and non-meditation complex, and anterior singulate contacts respectively”. Research and studies like this one demonstrated a declining brainstem auditory evoked potential, which may indicate a slowing down of halfway (inferior colliculous) transmission pace. A wide region was involved in the auditory association contacts, and there was a decrease in the speed of 70 transmission at the mid-latency region. “The study also suggested that there was an improved attention for the auditory odd-ball, hence it was summarized that the meditation is a distinctive state in which auditory stimulate improves whereas the speed of auditory information up to the primary level appears to be slowed” (Singh Deepeshwar and Shirley Telles 2). “It was noted in another study on dhāraṇa, dhyāna, cancalatā, and ekāgratā that automatic variables, evoked potentials, functional magnetic resonance imaging (FMRI), and cancellation task performance were used to evaluate the physiological impacts of those states. Male volunteers in good health, ranging in age from 20 to 55, participated in these research. All were at a Yoga centre and were actively engaged in studying and practicing yoga and they had normal health based on routine chemical examination. They were instructed to meditate on own along with practice of dhāraṇa and dhyāna. They were given three months orientation course by a qualified yoga instructor and these participants were assessed and four sessions for four separate days at the same time. Their experience and ability was based on self reports and in consultation with a yoga teacher”. “It was formed in an earlier study that the cerebral cortex activity was involved in meditation” (Lazar.et.al.2005, 3). “It was observed that the peak latency of a specific component, the wave v increases significantly all those four sessions, but there was no change during the practice of dhyāna. It was noted that the dhāraṇa practice was associated with delay and

also with practices of ekāgratā and Cancalatā and also when functional magnetic resonance imaging studies showed that left Para hippocampus gyrus was activated in ekāgratā which is concerned with the formation of spatial memory, there was also bilateral fusi-form gyri activation which is correlated with face and body recognition, recognition of numbers, words, and abstraction of concepts" (Thomas, et, al, 2009, 4). "The present study also included the performance of a six letter cancellation task which was assisted, before and after four practices. This task assisted selective attention and concentration. The results showed that the participants who are focusing on the symbol „OM" and favorable effect on selective attention, concentration, visualization, scanning abilities and repetitive motor responses. So, there was difference between dhāraṇa and dhyāna meditative states" (Shirley Telles, 5). "In another study on meditation on own, significant analyses were done with respect to 71 physiological alertness and increased sensitivity to sensory transmission, it is already referred to in the verses of Māṇḍūkya Upaniṣad that the three letters of „OM" represents the entire deep sleep stage, and it is symbolic of the past, present and future. It is also explained that all other sounds and things originate from Omkāra" (Ibid 6). There were scientific studies on „OM" and the meditators were suggested to concentrate on a picture of symbol „OM" and then asked to chant „OM" mentally and effortlessly. This resulted in a state of devoid of effort and focused attention which was characterized by blissful awareness. The automatic and respiratory variables were studied in experienced „OM" meditators who had an experience of 5-20 years in recitation of Omkāra and were subjected to meditation and control. It was observed that there was a significant reduction in the heart rate during meditation compared to the controlled period. It was noted that there was a comparable increase in the peripheral vascular region which was considered as a sign of increased mental alertness (Ibid 7). It was identified that the repetition of „OM" reduced skin resistance which denoted certain changes in the mental state (Ibid 8). This study observed that there was a significant cognitive involvement and a combination of mental alertness with periodic, physiological rest during „OM" meditation practices (Ibid 9). "A control study on the meditate effects of cyclic meditation on mindfulness state in normal healthy volunteers was done by Kumar S, Deepeshwar Singh, Naveen K V, and H R

Nagendra" (10). "They evaluated the initial impact of meditation practice on mindfulness employing Mindfulness Attention Awareness Scale (MASS)". Higher scores in the single meditation group linked to a single mindfulness element were shown to be connected with reduced mode distance and stress, according this research investigation. "Neuro-imaging studies showed changes in activation of pre-frontal cortex (PFC) and anterior singular cortex and which increased significantly Alpha and Beta activities during meditation". (Indian Journal of positive psychology, 2014, 5(4) 403, Ref: http://www.lahrw.com/index.php/home/jornal.details/19#list). In another study covering long latency auditory evoked potentials (LLAEP) done by Shirley Telles, Deepeshwar Singh, K V Naveen, and Subramanya Pailoor (11), Using mid-latency and short-latency auditory evoked potentials, the auditory sensory pathway in meditation practitioners has been investigated. The participants were evaluated in four mental states according to descriptions found in classic yoga literature, such as the Māṇḍūkya Upaniṣad. "The research suggested that deep meditation helps in processing of auditory information in the auditory association cortex, random thinking and it also helped in non - meditation, meditative focusing, which related in fewer regions, being recurred in auditory association areas" (Clinical EEG and Neuro Science page,1-12,EEG and clinical Neuro science society, ECNS, 2014).

"In one study examining the meaning and consequences of the syllable OM from ancient yoga texts, researchers contrasted these results with those of modern science". The ideas were collected from various ancient texts, including Munduka Upaniṣad, Māṇḍūkya Upaniṣad, Śvetāśvatara Upaniṣad, and Patañjali Yoga Sūtra-s. "The meditators in the study were instructed to concentrate on a picture of OM and mentally chant the Omkāra while visualizing the picture in their minds". This process resulted in a state of effortlessness, focused attention, and blissful awareness.

Researchers with five to twenty years of expertise in meditation examined the autonomic and respiratory variables during open-mind meditations (OM) practiced by participants.

The results of the study showed that during the real meditation session, heart rate was lower than during the control time. Furthermore, cutaneous peripheral vascular resistance significantly rose throughout both the meditation and control periods, suggesting that calm meditators were more alert mentally.

Participants in a different study on middle latency auditory evoked potentials underwent examinations both prior to and during their practice of "OM" meditation. “This investigation aimed to understand how neural processing at various levels may change during meditation when an idea, thought, or word, such as OM, was employed. It was observed that there was a slight but consistent reduction in the peak latency of the Nb wave during meditation”.

These research findings provide insights into the effects of OM meditation based on ancient yoga texts and how it aligns with contemporary scientific understanding. The studies shed light on the physiological changes that occur during OM meditation, highlighting its potential benefits in promoting relaxation, mental alertness, and altered neural processing.

“These results denoted that during meditation neural processing at the middle latency auditory evoked potentials changed with changes in neural activities. The research concluded that “OM” meditation with its three letters of A.U.M. and scientific studies suggested physiological alertness, increased sensitivity and synchronous biorhythms and sensitive sensory transmission (Meditation on OM relevance from ancient text and contemporary science by Sanjay Kumar, H R Nagendra, N K Manjunath, K V Naveen, Shirely Telles, IJOY “(vol 3 Jan-Jun, 2010, pp.1-5, 12). “In another study covering Neural correlates of working memory following the practice of meditation, a high – density EEG study revealed that by using meditation as a technique practiced by practicing for at least one year showed enhancement in their memory potentials”.

“Participants in the study were randomly assigned to undergo two separate sessions of cyclic meditation (CM) and supine rest. Following the meditation practices, the participants demonstrated shorter latency and significantly higher amplitudes, indicating a positive impact of meditation on brain activity”. “The areas of the brain with the highest activation during meditation were identified as the fusiform gyrus, paralippocampal gyrus, middle occipital gyrus, and the uncus” (Neuroscience, http;/www.absstracts online.com).

“Numerous research studies worldwide have been conducted to explore the positive physiological and psychological changes associated with meditation. These studies have focused on analyzing different meditation techniques and their corresponding EEG patterns, leading to the categorization of three main types of meditation”:

Focused attention: This type involves the voluntary and sustained attention on a chosen object during meditation.

Open monitoring meditation: In this approach, practitioners non-reactively monitor the moment-to-moment content of their experiences without becoming emotionally entangled.

Automatic self-transcending: This category includes several meditation techniques that facilitate the transcending of automatic thoughts and self-awareness, leading to a state of higher consciousness.

“The participants in the study were exposed to four distinct mental states: cancalatā (random thinking), ekāgratā (non-meditative concentration), dhāraṇa (focused meditation), and dhyāna (defocused meditation)”. “Through the use of the Visual Analog Scale, it was determined that dhāraṇa scored differently compared to cancalatā, ekāgratā, and dhyāna. This indicated that dhāraṇa was the most challenging of the four states”.

“The practice of dhāraṇa involves engaging in mental visualizations and intense focusing on the Sanskrit mystic syllable "OM."” This technique requires the meditator to direct their attention to the sacred symbol, "OM," fostering a state of concentrated awareness and mindfulness.

The meditation practices examined in the study have been found to activate distinct brain regions associated with monitoring vigilance and disengaging attention from distracting stimuli. This indicates that the brain areas involved in cancalatā, ekāgratā, dhyāna, and dhāraṇa are different from each other. The results of the studies demonstrated that cancalatā, ekāgratā, and dhyāna can be performed with equal ease, while Dhāraṇa is the most challenging state compared to the other three.

“Another research study explored meditative focusing (dhāraṇa) and the state of mental expansiveness (dhyāna), as well as random thinking (cancalatā) and one-pointed focusing (ekāgratā). Autonomic variables, evoked potentials, and functional magnetic resonance imaging (FMRI) were used for assessment”. “The autonomic variables included heart rate, heart rate variability, skin resistance, finger amplitude, and breath rates. Assessments were conducted before the participants began the meditation, during the practice for five and twenty minutes, and five minutes after the meditation”.

The results of the study showed that during cancalatā and ekāgratā, there was an increase in skin resistance level, indicating sympathetic activity. Breath rate decreased during dhyāna, suggesting heightened calmness. Furthermore, during the dhāraṇa, ekāgratā, and cancalatā stages, wave V grew dramatically; however, wave V did not change during the dhyāna practice. Additionally, prior research has demonstrated that wave V increases are associated with the inferior colliculi in the midbrain.

These findings highlight “the differences between the dhāraṇa and dhyāna meditative stages”, based on the descriptions provided in ancient yoga texts. The research suggests that these meditative states elicit distinct physiological responses, supporting the traditional wisdom found in yoga teachings

“It was observed that understanding of the descriptions of meditative states may help further in contemporary research finding” (Shirley Telles and Bhat Ramchandra Raghavendra, 12). “Neuro physiological changes in meditation correlated with description from the ancient Texts Association for applied Psychological Physiology and biofeed back”, www.aapb.org,biofeedback volume 39, issue 2, pp. 56-59 Dol.10, 5298/108/-5937-39.2.08 (16). “Mindfulness refers to an awareness that emerges by paying attention to purpose and to the present movement and non judge mentally focusing on the unfolding of one‟s immediate experience” (Brown K W, Ryan RM, 17).

Mindfulness is currently being considered as a cognitive behavior rather than a physiological one. It assists individuals in developing an enhanced awareness of their moment-to-moment experiences, particularly perishable mental processes. The study titled "Self-reported Measures of Mindfulness in Meditators: A Cross-Sectional Study" aimed to explore this concept.

A total of healthy male volunteers, comprising 66 meditators and 67 non-meditators, participated in the study. Their ages ranged from 25 to 35 years, and they were selected from SVYASA Yoga University in Bangalore, along with non-meditators from similar institutions in India. The meditators had a minimum of three years of experience in meditation, while the non-meditators had no prior exposure to any form of yogic practices and were unaware of the study's objectives.

For the research study, a standard questionnaire was distributed to the participants during a 30-minute classroom session, and all the participants, who were postgraduate students, completed the questionnaire. The researchers utilized the popular MAAS Technique (Mindfulness Attention Awareness Scale) to assess mindfulness. This 15-item self-reported scale focuses exclusively on the attention and awareness component of the mindfulness construct. The instrument has been used effectively in various individuals.

Upon analyzing the collected data, the researchers found that the MAAS scores were significantly higher among meditators compared to non-meditators. This outcome indicated a positive correlation between the levels of meditation practice and the levels of mindfulness in the participants.

In conclusion, the study provided insights into mindfulness as a cognitive behavior and its relationship to meditation practice. The findings supported the idea that regular meditation practice is associated with higher levels of mindfulness. This research contributes to the growing understanding of mindfulness and its potential benefits in enhancing self-awareness and attention to the present moment.

Cyclic Meditation (CM), developed by Yoga scientist Dr. H.R. Nagendra, incorporates physical postures (āsanas), breathwork, and the integration of physical and mental awareness, culminating in a state of meditation (Nagendra H.R, Nagaratna R, 14). The development of mindfulness arises from consistent and dedicated meditation practice, aligning with the principles of aṅtaraṅga yoga as outlined by Patañjali.

Dr. H.R. Nagendra's Cyclic Meditation is a comprehensive approach that combines various elements of yoga, including physical postures, controlled breathing, and heightened awareness of the mind and body. Through the systematic practice of CM, individuals are

guided towards a meditative state, fostering mindfulness and a deeper connection with the present moment.

According to Patañjali's teachings, the state of mindfulness, or aṅtaraṅga yoga, is an integral aspect of the yogic path. It is cultivated through consistent effort and dedication to meditation practices, leading to an inner state of heightened awareness, concentration, and self-realization.

6.1 CONCLUSION

The findings of the researchers at SVYASA were found to be closely aligned with the concepts presented in the Patañjali Yoga Sūtras regarding the development of mindfulness. The study revealed a positive correlation between the duration of meditation practice and the level of mindfulness experienced during cyclic meditation. In previous research on mindfulness, various neuro-imaging techniques such as Electroencephalography (EEG) and Event-Related Potentials (ERP) studies were used to analyze changes in the activation of the prefrontal cortex (PFC) and the anterior cingulate cortex (ACC), as well as significant increases in alpha and theta brainwave activity during meditation.

The results obtained by the researchers at SVYASA validate and support the principles outlined in the Patañjali Yoga Sūtras, highlighting the importance of consistent and dedicated meditation practice in cultivating mindfulness. The positive correlation between the duration of meditation practice and the level of mindfulness emphasizes the transformative potential of regular meditation on one's mental state.

Furthermore, previous studies utilizing advanced neuro-imaging techniques have provided valuable insights into the neurological changes associated with mindfulness meditation. The increased activation of the prefrontal cortex and anterior cingulate cortex, along with

elevated alpha and theta brainwave activity, suggest enhanced attention, focus, and relaxation during meditation.

. This pattern of activation is commonly associated with meditation and relaxation (Chan B.R, Polich J, 15), meditation status and traits, EEG, ERP and neuro-imaging studies (Psychol 76 Bull, 2006:132:180-211, 15). There is enough evidence of changes in PFC during mindfulness meditation, which is associated with attention, concentration and emotion regulation. There have been other studies covering brain related self-awareness whose findings show a great promise for the individual‟s ability to train the mind which not only changes the emotional experiences but also structure of the brain and its functioning.

6.2 SUMMARY

In the sixth chapter titled "Anveṣaṇa: Research on Dhāraṇa and Dhyāna at SVYASA University," an analysis was conducted on the results obtained by the researchers at SVYASA. The findings revealed a significant alignment with the concepts of mindfulness development as outlined in the Patañjali Yoga Sūtra. The study indicated that the duration of meditation practice, particularly during cyclic meditation, showed a positive correlation with the level of mindfulness.

The research conducted at SVYASA University shed light on the relationship between the duration of meditation practice and the degree of mindfulness experienced by the practitioners. The results highlighted that engaging in cyclic meditation for longer durations resulted in a higher level of mindfulness. These findings align closely with the principles described in the Patañjali Yoga Sūtra, which emphasizes the gradual development of mindfulness through consistent and focused meditation practice.

In conclusion, the research conducted at SVYASA University demonstrated a significant correlation between the duration of meditation practice and the level of mindfulness achieved during cyclic meditation. These outcomes support the traditional principles outlined in the Patañjali Yoga Sūtra, further validating the importance of regular and dedicated meditation practice in cultivating mindfulness.