

Issues and Methods in Meditation Research

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Abstract - Most research has been seen the growing interest in the neurobiological correlates of meditation. They omitted the philosophical aspects of meditation on human being and its wider implications on human. Hence the following issues like definition, study design, and its outcomes need to be study. In meditation research the effects of meditation practice need to examine and also how meditation works is need to study and examine. Some meditation techniques reduce pain, but how meditation affects the brain's response to pain is not been studied. The brain structural differences between a well-matched sample of long-term meditators and controls using whole-brain cortical thickness also need to analyze. This paper describes the issues related to meditation and their effects on the study of meditation with some explanation of methods in meditation research.

Keywords- *Meditation, neurobiological, Consciousness, Thoughtless awareness, Attention, Psychiatry, Depression, Anxiety, Stress, Pain EEG.*

I. INTRODUCTION

Different challenges are faced by the people work in the industries, offices and even in business in real life. Our attention and concentration plays vital role in the human behavior. It is very difficult to handle the psychological stress some times. Therefore, Meditation is essential for all human beings to come out of the above mentioned troubles. The consciousness could be promoted through the meditation.

In recent years, research on meditation is correlates with neural and its efficacy in clinical settings has seen a growing trend. Meditation training has been carried with a wide range of positive clinical and behavioral health outcomes. Several researchers have identified key areas of the brain and other electrophysiological correlates long-term meditator[4]. The study of expert meditators offers promising research strategy for studying high-order cognitive processes. Bhuvanesh Awasthi identifies number of issues and shortcomings remain in the area of meditation research. This may be due to a variety of reasons such as simple omissions, relative unfamiliarity with the concept of meditation, lack of suitable resources to address these issues. A wide variety of techniques of meditation are available. Meditation research presents an encouraging trend for the new aspect of how the mind works. The research shows that lifestyle changes can improve individual biomarkers of allostatic load, leading toward greater health and normal aging by the practice of Transcendental Meditation (TM) program and changes in diet and physical activity reduce biological aging factors may reduce overall

allostatic load in hypertensive African Americans said by Liis Mattik [5].

The comparison between Jung and Ramana Maharshi regarding the nature and purpose of meditation is presented by Jung Glenn Friesen. Jung uses the word 'Self' to refer to our selfhood in its totality, both for conscious and unconscious, personal and impersonal. He said Self is different from our ego, but it includes and transcends our ego therefore he had used the word 'transpersonal' for this impersonal Selfhood [6]. The changes of Meditation on body, brain physiology and for clinical effectiveness in disorders of psychiatry is review by Katya Rubia. Meditation is use to reduce or eliminate irrelevant thought processes through psycho-emotional stability, training of internalised attention, stress reduction, thought to lead to physical & mental relaxation and enhanced concentration. Some evidences for the effectiveness of Meditation in disorders of affect, anxiety and attention in clinical studies. Thorough understanding of the neurobiological mechanisms of action and clinical effectiveness of the different Meditative practices is needed in the prevention and intervention of mental illness [7].

Meditation research has begun to clarify the brain effects and mechanisms of contemplative practices while generating a range of typologies and explanatory models. The chakra system from Indian yoga, is used as a map of CNS function in traditional Indian and Tibetan medicine, neuropsychiatry, and neuropsychology. The study presented by Joseph J. Loizzo based on the Nalanda tradition, established a connection between subtle body model cross-referenced with modern CNS maps and challenges modern brain maps with its

embodied network model of CNS function. This challenges meditation research by presenting a more rigorous, neural-based typology of contemplative practices, complete network model of the mechanisms of contemplative practices [9].

Susan Marie Chaney explores how desire is a motivator for individual change and growth. The driving force of tension between the mind and body is observed due to conscious presence of material desires. How the body communicates biologically aids in our understanding of some of the conflicts that arise in the individual is examined by understanding the autonomic nervous system and our ability to shift from a state of trauma to relaxation through movement and conscious attention. Human beings are interpreting energy information on so many different levels at any given time. This will affect us physically, mentally, emotionally, and spiritually. Energy information is decoded and intergraded from physical energy called gross energy to subtle energy that is not so easily measured. The subtle energy system, which is best known as the chakra system, is a subtle energy structure that interfaces between the physical body and the subtle energies. The chakra system is the structural component through which archetypes move. The chakra system, the archetypes of platonic solids, and traditional elements associated with each chakra examination is the paths to accessing conscious awareness[08]. Electro-Encephalogram (EEG) signals and its classification are of recent interest in Brain Computer Interface systems. The distinguished investigation of EEG patterns due to various activities such as meditation, sleeping, reading, etc. needs to be examined. Rahul R Ingle presented focuses on classification of EEG patterns for alcoholic and controlled states [11]. Meditation is a very relaxed state and at the same time it is a very alert state. R.Jevning et.al. finds during meditation increased cardiac output, cerebral blood flow and findings reminiscent of apparent cessation of CO₂ generation by muscle and EEG synchrony play critical roles[12].

II. WHAT IS MEDITATION

Meditation is a physiological state of mind reduced metabolic activity that elicits physical and mental relaxation and enhance psychological balance and emotional stability (Jevning et al., 1992). In Eastern philosophy higher state of consciousness called fourth state of consciousness has been described as a state of thoughtless awareness by Buddha (Ramamurthi, 1995). In thoughtless awareness the incessant thinking processes of the mind are eliminated slowly by practice and the practitioner experiences a state of deep mental silence. This state can be achieved by the continuous practice of Meditation. It is observed that a large variety of Meditation practices available today and some of them not aiming to achieve anything beyond relaxation.

The original goal of Meditation is the elimination or reduction of thought processes, the cessation of the internal

dialogue of the mind. This elimination of thinking process leads to a deep sense of physical and mental calm and, untainted by thoughts, enhancing pure awareness and perceptual clarity. A common experience of Meditation is a metacognitive shift where thoughts and feelings full attention can be observed from a detached witnessing awareness from which they can be dealt with in a more efficient manner. The ultimate goal of many traditional Meditation techniques is achieving this mystical peak experience of complete thoughtless awareness.

The majority of Meditation techniques give an attention to training by which thoughts are consciously manipulated. This is either the narrowing or focussing of the attention on internal events such as breathing, an object, one point in space, or a mantra (several Buddhist practices, Yoga Nidra, Sahaja Yoga) or expanding the attention non-judgmentally on the moment to moment experience and observing thoughts and feelings from a meta-cognitive awareness state (Mindful Meditation, Vipassana and Zen Buddhist practices) (Ivanovski and Malhi, 2007). Most Meditation techniques therefore as a prerequisite to the ultimate goal of thoughtless awareness enhance mediator concentration, self-monitoring and cognitive interference control (the ability to inhibit interference or disruption from unwanted thoughts or irrelevant external events). Although achieving the peak experience of thoughtless awareness is the goal of the Meditator, it is the long-term trait effects of Meditation, achieved after years of training that are thought to be therapeutic.

The subjectively reported benefits of Meditation by long-term trait effects of Meditation practices include at a:

- a) Physical level: feelings of deep relaxation and stress relief;
- b) Cognitive level: enhanced concentrative attention skills, improved self-control and self-monitoring and better ability to inhibit irrelevant interfering external and internal activity;
- c) Emotional level: positive mood, emotional stability and resilience to stress and negative life events (detachment);
- d) Psychological level: personality changes such as enhanced overall psycho-emotional balance.

Very few studies have investigated the objectively measurable physiological, psychological and neurophysiological changes that correlate with the subjectively reported benefits of Meditation. Hence there is need to study and compare between different Meditation techniques in order to shape out the technique-specific differences of the effects of these diverse techniques on cognitive function, behavior, neurobiology, underlying physiology and clinical effectiveness. The EEG frequency spectra constituted a continuum with increasing theta and delta activity and decreasing alpha activity as the participant tended to fall asleep [10]. Bent Stigsby et. al. finds the frequency spectrum situated between that wakefulness and drowsiness and remain virtually unchanged during the 20 minute of meditation.

III. METHODS OF MEDITATION

There is a vast work done in design framework of functional and structural brain activity related to meditation practice. Most of the meditation research has been carried out on the psychological and neuroscientific perspective. It needs to address that how does meditation bring about changes at the cognitive level, neural level and behavioral level [4]. The attempts are made to consolidate research findings from a psychological, conceptual and neural perspective. Some attempts are reported as combining concepts like attention and emotional regulation, body and self awareness. The philosophical underpinnings of meditation practice in the neuroscientific context are reported by some researchers. Wide variety of meditative practices are used to achieve altered states of consciousness. It is therefore sometime claimed that meditation and its study will contribute to understand neural basis of consciousness. It still remains the area of research that how the meditation relates to the prevalent information processing concept of the mind.

In [2] author was examined the brain structural differences between a well-matched sample of long-term meditators and controls using whole-brain cortical thickness analysis based on magnetic resonance imaging, and diffusion tensor imaging. The comparison is conducted between the brains of experienced meditators with matched meditation of new volunteers. Do-Hyung Kang et.al. observed the meditators, showed significantly greater cortical thickness in the anterior regions of the brain, located in frontal and temporal areas, including the medial prefrontal cortex, superior frontal cortex, temporal pole and the middle and interior temporal cortices [2].

Some meditation techniques reduce pain, but how meditation affects the brain's response to pain is not been studied. The results suggested by David W Orme Johnsona shows the Transcendental Meditation technique longitudinally reduces the affective, motivational dimension of the brain's response to pain. Functional magnetic resonance imaging of the response to thermally induced pain applied outside the meditation period. The Transcendental Meditation technique observed reduced voxels responding to pain in the thalamus and total brain [3]. After the controls learned the technique and practiced it for 5 months shows the decreased response by 40-50% in the thalamus, prefrontal cortex, total brain and anterior cingulate cortex.

REFERENCES

[1] Ajay Anil Gurjar and Siddharth A. Ladhake, "Time-Frequency Analysis of Chanting Sanskrit Divine Sound "OM" Mantra", International Journal of Computer Science and Network Security IJCSNS, VOL.8, No.8, pp. 170-175, August 2008.

[2] Do-Hyung Kang et.al., "The effect of meditation on brain structure: cortical thickness mapping and diffusion tensor imaging", Published by Oxford University Press, 2012.

[3] David W. Orme Johnsona, "Neuroimaging of meditation's effect on brain reactivity to pain", NIH Public Access, PMC January, 2008.

[4] Bhuvanesh Awasthi, "Issues and perspectives in meditation research: in search for a definition", Frontiers in psychology, Review Article, Vol 3, Art 613 pp. 1-9, Jan 2013.

[5] Liis Mattik, "Effect of the Transcendental Meditation Program and Health Education on Allostatic Load: Promoting Normal Aging", Ph.D. Dissertation, Graduate School Maharishi University of Management Fairfield, Iowa, July, 2011.

[6] Dr. J. Glenn Friesen, "Jung, Ramana Maharshi And Eastern Meditation", 2005, Revised notes from lectures given at the C.G. Jung Institute, K nsnacht, May 4-5, 2004.

[7] Katya Rubia, "The neurobiology of Meditation and its clinical effectiveness in psychiatric disorders", Elsevier, Biological Psychology, 82, pp. 1-11, 2009.

[8] Susan Marie Chaney, "The Embodied Experience of Rising Consciousness: The Somatics of the Energy of Desire and Practices for Expanding Self-Awareness", Ph.D. Thesis, Ann Arbor, 2015.

[9] Joseph J. Loizzo, "The subtle body: an interoceptive map of central nervous system function and meditative mind-brain-body integration", Annals Of The New York Academy Of Sciences, Issue: *Meditation*.

[10] Bent Stigsby et. al., "Electroencephalographic Findings During Mantra Meditation (Transcendental Meditation) A Controlled, Quantitative Study of Experienced Meditators", Electroencephalography and Clinical Neurophysiology, Elsevier, pp. 434-442, 1981.

[11] Rahul R Ingle, Sonal Oimbe, R.N.Awale, "Support Vector Machine Based Classification Of EEG Signals For Alcoholic And Controlled State Using Wavelet Packet Transform", International Journal Of Advanced Computing And Electronics Technology (IJACET), Volume-3, Issue-6, pp. 2394-3416, 2016.

[12] R.Jevning, R.K.Wallacet, M.Beidebach, "The physiology of meditation: A review. A wakeful hypometabolic integrated response", Neuroscience & Biobehavioral Reviews, Elsevier, Volume 16, Issue 3, pp. 415-424, Autumn 1992.