

# CHAPTER - 4



# AIMS AND OBJECTIVES

## 4.0 AIMS AND OBJECTIVES

### 4.1 AIMS OF THE STUDY

The present study was intended to obtain a greater understanding on measuring indicators of neuronal activity and cerebral blood flow changes in four mental states (*cañcalatā*, *ekāgratā*, *dhāraṇā*, and *dhyāna*) as defined in traditional yoga texts.

### 4.2 OBJECTIVES OF THE STUDY

- The objectives of the present study was to review and compile the authentic information on the growth of individual awareness from classical Yogic and Spiritual literature.
- To explore the Indian and Western concept of consciousness or awareness.
- To investigate the effect of four mental states viz. *cañcalatā*, *ekāgratā*, *dhāraṇā*, and

*dhyāna* on:

- i. Long latency auditory evoked potentials (LLAEPs),
- ii. Simultaneous recording of P300 Event Related Potentials (ERPs) and Heart Rate variability (HRV),
- iii. Hemodynamic changes in meditation related to cognitive task,
- iv. Mindfulness and state and trait anxiety,
- v. Positive states of mind (POSM) and executive control in meditators and non-meditators,
- vi. Subjective assessment of following the guided instructions for *cañcalatā*, *ekāgratā*, *dhāraṇā*, and *dhyāna* using visual analog scale (VAS), and also

- vii. Correlation of VAS with attention (measured in P300 ERPs) and accuracy (counted clicks during Oddball task).

### 4.3 JUSTIFICATION OF THE STUDY

Scientific studies on various forms of meditation (such as *OM* meditation, Sahaja Yoga meditation, Brahmakumari Raja Yoga meditation, Vipassana meditation, Transcendental meditation etc.) have shown psychophysiological, neurophysiological and neurochemical changes. The results are varied across these studies due to different techniques, methods and the underlying principles of each meditation practice. Previous studies on brainstem and midlatency auditory evoked potentials have been recorded during four mental states viz., *cañcalatā*, *ekāgratā*, *dhāraṇā*, and *dhyāna* with an encouraging degree of inter-subject consistency. It is believed that the meditation influences subcortical and cortico-efferent connections which would affect neuronal activity of the cortex. The neuronal activity of the cortex is measured through long latency auditory evoked potentials (LLAEPs). There is just one study on LLAEPs during Transcendental Meditation (TM). In that study, LLAEPs were recorded in eight experienced meditators, ‘Before’, ‘During’ and ‘After’ meditation and also during light sleep. No consistent changes were noted between baseline and meditation in long latency auditory evoked potentials or between meditation and sleep.

The long latency auditory evoked potentials (LLAEPs), simultaneous recordings of P300 event related potentials (ERPs) and heart rate variability (HRV) and also, cerebral blood flow have not been studied in these four states (i.e., *cañcalatā*, *ekāgratā*, *dhāraṇā*, and *dhyāna*).

In the present study, we have evaluated LLAEPs, simultaneous recordings of P300 ERPs and HRV in meditative and non-meditative states. Subsequently, we assessed cerebral hemoglobin responses in meditation related to attention. And also, the present study was designed to assess the correlations of (i) mindfulness and state-trait anxiety, (ii) Positive states of mind (POSM) and executive control in meditators and non-meditators, (iii) visual analog scale (VAS), accuracy and attention (P300 latency and amplitude).

### 4.4 HYPOTHESIS AND NULL HYPOTHESIS

The hypothesis of the present study was that, the four mental states i.e., two meditative (*dhāraṇā* and *dhyāna*) and two non-meditative (*cañcalatā* and *ekāgratā*) may:

1. Influence neuronal activity of the brain, especially at the cortical level
2. Affect neuronal network related to attentional processes
3. Enhance cerebral blood flow in the bilateral prefrontal cortex in meditative states related to attentional task
4. Enhance mindfulness and reduce State and Trait anxiety
5. Have a positive correlation of Visual Analogue Scale with accuracy and attention