compared to before. This suggests that during dhyāna auditory information transmission was delayed at the inferior collicular level (the tectum) as the wave V corresponds to the tectum. Also the autonomic and respiratory variables suggested a higher magnitude of psycho-physiological relaxation during dhyāna as compared to other sessions. Performance in the six letter cancellation task also suggested that meditative focusing (dhāraṇā) may improve attention.

1.1 BACKGROUND

Meditation has become popular throughout the globe since 1960 while it has been in vogue for centuries. It is a systematic approach for an individual to become one with the object of meditation and ultimately the highest level of consciousness of which man is capable (Taimni, 1961). During meditation a state of mind is reached which is characterized by deep relaxation as well as increased internalized attention (Murata, et al. 1979).
Meditation as part of yoga in general has been described as a training in awareness which produces definite changes in perception, attention and cognition (Brown, 1977). Based on changes in oxygen consumption, carbon dioxide elimination, breath rate and the electroencephalogram (EEG), the practice of Transcendental meditation (TM) has reported to induce a ‘wakeful hypo-metabolic physiologic state’ (Wallace & Benson, et al. 1971). Similarly, a decrease in oxygen consumption occurred following meditation on a meaningful syllable, ‘OM’ which was accompanied by decrease in cutaneous blood flow suggesting an increase in sympathetic vasomotor tone. This suggested that meditation on ‘OM’ produces a state of alertful rest (Telles, et al. 1998). The relationship between the mental state and body physiology; emotional and cognitive processing and the biological correlates of religious experience are being studied (Newberg & Iverson, 2003). The verbal definition of different phases of meditation do not merely serve to label sections of a meditation sequence which, are basically similar but they actually refer to evidently different physiological brain states (Lehmann, 2001).

Studies were conducted on meditators using the self-as-control design in both meditation and non-meditation sessions in Brahmakumārē Rāja yoga meditation suggested that both autonomic activation and relaxation occurred simultaneously in different sub-divisions of the autonomic nervous system in a subject; hence a single model of sympathetic activation or overall relaxation was considered inadequate to describe the physiological effects of a Brahmakumārē Rāja yoga meditation technique (Telles & Desiraju, 1993b).
1.2 TRANSCENDENTAL MEDITATION (TM) - ALERTFUL REST

Popularity of meditation started throughout the globe by TM movement started by Maháñi Mahesh Yogi. Extensive scientific exploration proved the usefulness of TM. TM opened up a new dimension of a state of mind in which the meditator can be in deep rest, but totally alert. This became open the earlier concept that mind is resting indicative of inertia and laziness or should be active and dynamic without rest; a new vision of alertful rest emerged.

The practice of TM was reported to cause reductions in heart rate, respiratory rate, and oxygen consumption and to increase the level or stability of the electrodermal response (Wallace, 1970; Wallace, et al. 1971). TM was hence described as a ‘wakeful hypometabolic physiologic state’. A later report (Heide, 1986), noted a difference in the heart rate response but not in the electrodermal response evoked by 80 dB tones, when TM meditators and non-meditators were compared. More recently, the practice of TM has shown to reduce cardiovascular sympathetic activity both at rest and during a simulated car driving stressor in adolescents at risk for hypertension (Barnes, et al. 2001). These reports suggest that the practice of TM reduces sympathetic activity. This concept of predominant parasympathetic activity during TM was mentioned in a recent review (Newberg & Iverson, 2003).

1.3 CONTROVERSY ABOUT DIFFERENT TYPES OF MEDITATION

However, contradictory results were observed in Zen and Tántric meditations. One set of studies reported changes suggestive of autonomic activation (Hirai, 1974; Corby & Roth, et al. 1978), while another set of studies reported changes

The autonomic and respiratory variables were studied in OM meditators (Telles, et al. 1995). In seven experienced meditators (with experience ranging from 5 to 20 years). Each subject was studied in two types of sessions—meditation (with a period of mental chanting of OM) and control (with a period of non-targeted thinking).

The meditators showed a statistically significant reduction in heart rate during meditation compared to the control period. During both types of sessions, there was a comparable increase in the cutaneous peripheral vascular resistance. This was interpreted as a sign of increased mental alertness even while being physiologically relaxed (as shown by the reduced heart rate). When repetition of ‘OM’ was compared with the repetition of ‘ONE’ in twelve meditators, there was a difference in the autonomic and respiratory responses (Telles, et al. 1998). Both types of sessions resulted in a decrease in the heart and breath rates, but repetition of OM alone reduced the skin resistance indicative of alertness, suggesting a subtle change in the mental state, related to the significance of the syllable. It was interesting to note in a single case study that an accomplished meditator was able to switch between ‘single thought’ and ‘no thought’ states at will, with significant differences in the breath rate and pattern between the states (Telles & Desiraju, 1992). Meditation has a noticeable influence on blood pressure, which dropped much lower than normal. Also there was a reduction in heart rate and skin conductance after meditation (Vemapati & Telles, 2002). A recent study showed an increase in sympathetic activation in the yoga posture phases of Cyclic
Meditation (where ‘CM’ is a combination of yoga postures and relaxation techniques) while parasympathetic dominance increased after Cyclic Meditation (Sarang & Telles, 2006). With several types of meditation techniques having been identified it is more difficult and confusing to understand what meditation involves.

A similar trend of variability between meditation techniques, between meditators, and in the same meditators assessed on different days was found in middle latency auditory evoked potentials (Telles & Desiraju, 1993a). The fact that subjects had evolved individual methods of meditation, which was taken to explain the inter-individual variability. In a subsequent study (Telles, et al. 1994) senior meditators with comparable experience of meditation attended a ten-day meditation camp where they were given common instructions on meditation i.e., to focus attention on the visual image of OM while mentally chanting it. This resulted in group significant changes in mid latency evoked potentials.

1.4 NEW RESEARCH DESIGN

An early study on meditation (Telles & Desiraju, 1993a) used for the first time, two important modifications in the research design for yoga research. Here subjects were studied using the ‘self-as-control’ design and the two types of sessions, meditation and non-meditation, were repeated thrice in each subject. This study highlighted two points, (i) meditation is best described as a physiological state of ‘alertful rest’, and (ii) considerable physiological variations are seen both intra- and inter-individually. This study assessed the effects of meditation on the syllable ‘OM’ on mid-latency auditory evoked potentials, it was found that in
seven experienced meditators during meditation there was a significant decrease in the peak latency of the Nb wave (the maximum negativity occurring between 35 and 65 ms.) In another study on the effects of meditation on ‘OM’ on mid-latency auditory evoked potentials were studied in experienced meditators and novices (Telles, et al. 1994). There were two types of sessions before, during and after (i) mental repetition of ‘OM’ (meditation session) and (ii) mental repetition of ‘ONE’ (control session). The experienced meditators showed a significant increase in the peak amplitude of the Na wave (the maximum negative peak between 14 and 18 msec.) during the meditation with a significant decrease in the Na wave peak amplitude during the control session. Hence during mental repetition of a meaningful syllable (‘OM’) and of a neutral syllable (‘ONE’) neural changes occurred at the same level (possibly diencephalic) though in opposite directions.

Studies on short latency auditory evoked potentials have not shown such clear changes (McEvoy, et al. 1980) In that study brainstem auditory evoked potentials (BAEP) were measured in five advanced practitioners of TM to determine whether such responses would reflect an increase in perceptual acuity to auditory stimuli following meditation. The BAEP provide an objective physiological index of auditory function at a subcortical level. Repeated measures of the BAEP of TM practitioners were taken before and after a period of meditation and were compared with those of age-matched controls. Peak latencies as well as interwave latencies between major BAEP components were evaluated. No pre-post meditation differences for experimental subjects were observed at low stimulus intensities (0—35 dB). At moderate intensities (40—50 dB), the latency of the
inferior collicular wave (wave V) increased following meditation. However at higher stimulus intensities (55—70 dB), the latency of this wave was slightly decreased. Comparison of slopes and intercepts of stimulus intensity-latency functions indicate a possible effect of meditation on brainstem activity (McEvoy, et al. 1980). This study on short latency auditory evoked potentials in TM meditation practitioners demonstrated that short latency auditory evoked potentials vary with stimulus characteristics.

1.5 STUDIES ON PHASES & TYPES OF MEDITATION

Naveen and Telles (2005) found during meditation on ‘OM’ the changes during the dhāraēā and dhyāna phases were different and distinct. In the dhāraēā phase the change suggested reduced physiological arousal whereas in dhyāna phase the changes were suggestive of ‘alertful rest’. Also, the evoked potential changes suggested facilitated neural transmission and better cortical neural synchrony. In the two phases of BK meditation the changes were almost directly opposite to those during meditation on ‘OM’. During the dhāraēā phase there was a state of ‘alertful rest’ with facilitated cortical neural transmission and greater cortical neural synchrony. However, in the dhyāna phase the changes were suggestive of ‘alertful rest’.

There were also marked differences between the two meditation techniques when subjects were actively attending to or ignoring external stimuli. During the practice of ‘OM’ meditation when subjects actively attended to the external auditory stimuli, there was a decrease in arousal whereas in the case of BK meditators there was no change. When the meditators were actively ignoring the external stimuli
‗OM‘ meditators showed ‘a state of alertful rest’ and delay in cortical neural transmission while on BK meditators it actually produces ‘a state of physiological arousal along with a delay in cortical neural transmission’.

The findings have shown that the changes during the phases are different and also differ between meditational techniques. Also, the differences appear to fit in to the fairly well recognized descriptions of meditations of largely of two types i.e., ‘Concentrative’ and ‘Mindfulness’.

1.6 THE PRESENT STUDY

Based on the above studies, it appears that there are differences in types of meditation as also in different phases of meditation. So the present study deals with studying different phases of meditation based on descriptions in traditional yoga texts. In the traditional texts [the Patañjali’s Yoga Sūtras (Taimni, 1961) and Bhagavad Gétä (Bhaktivedánta Svámé Prabhupāda, 1998)] it has been described that when awake and in the absence of a specific task the mind is very distractible (caīcalatā), and has to be taken through the stages of ‘streamlining the thoughts’ (concentration or ekāgratā), and one-pointed concentration (focusing or dhāraēā), before reaching the meditative state (defocused, effortless single thought state or dhyāna).

Thus’ the present study was carried out to evaluate one of the effects of meditation practice which aimed at assessing the psycho-physiological correlates (brainstem auditory evoked potentials and autonomic with respiratory variables and performance in a letter cancellation task which assess selective attention) in four different states of consciousness detailed above, namely (i) caīcalatā, (ii)