CHAPTER-8

Appraisal of the Study
GENERAL

The appraisal of the research work in this doctoral thesis is presented under the following headings:

1. Summary of the findings
2. Implications of the study
3. Applications of the study
4. Limitations of the study
5. Suggestions for future studies

8.1 SUMMARY OF THE FINDINGS

The study was performed on fifty-seven healthy male participants with age range from 18 to 40 years (group average age ± S.D., 26.5 ± 4.6 years), who were each studied in two sessions, one of cyclic meditation and the other of supine rest. Each session consisted of Pre (5 minutes), During (22:30 minutes) and Post (15 minutes) states while middle latency auditory evoked potentials (MLAEPS) were recorded and all the other paper pencil tasks were assessed in Pre and Post periods of CM and SR.

Hence, the present study was designed to determine the effect of both CM and SR on digit letter substitution task, which is also a measure of attention as well as two tasks for motor functions (i.e., letter copying task and circle dotting task), in addition to this the effects of CM and SR were studied on components of Wechsler memory scale as well as state anxiety (STAI) to determine if anxiety influenced
performance. Finally, in an attempt to understand whether sensory processing at cortical and sub-cortical levels is facilitated or not by CM and SR, midlatency auditory evoked potentials (MLAEPs) were recorded at the beginning and end of both practices.

For each of the variables the data were analyzed separately using repeated measures ANOVA followed by post-hoc analysis.

The practice of CM has resulted in prolonged latencies of evoked potentials generated within the cerebral cortex, supporting the idea of cortical inhibition after CM. The present study also showed better performance in a digit-letter substitution task, as well as in tasks for motor speed following the practice of CM. Following a period of supine rest there was improved performance in tasks for motor speed, but not in the digit-letter substitution task. The study also showed that CM practice improves the performance in memory tasks and reduces state anxiety more than a comparable period of SR.

8.2 CONCLUSION

The practice of CM has resulted in prolonged latencies of evoked potentials generated within the cerebral cortex, supporting the idea of cortical inhibition after CM. The present study also showed better performance in a digit-letter substitution task, as well as in tasks for motor speed following the practice of CM. Following a period of supine rest there was improved performance in tasks for motor speed, but not in the digit-letter substitution task. The study also showed that CM practice
improves the performance in memory tasks and reduces state anxiety more than a comparable period of SR.

8.3 IMPLICATIONS OF THE STUDY

The present study demonstrated that approximately 23 minutes of cyclic meditation (CM) as well as 23 minutes of supine rest (SR) in shavasana had a favorable effect on performance tasks for selective attention, repetitive motor activity, primary working memory and associate learning. In addition to an improvement in performance both practices were associated with lower state anxiety. However, in all cases the magnitude of change was greater following CM compared to the change following SR.

This implies that the cyclical combination of yoga postures (asanas) and rest while supine has an even greater effect on the performance tasks cited above compared to SR. This may be related to the fact that CM practice decreases state anxiety more than SR.

In addition to the performance task the present study also assessed the effects of CM and SR on midlatency auditory evoked potentials. This was to assess at what level along the neuraxis any change occurred. A decrease in latency of components generated within the cerebral cortex occurred following CM whereas SR was followed by decreased latency in sub-cortical components. Decreased latency implies increased inhibition. Hence, CM practice may be a method to reduce cortical excitation and increase cortical inhibition.
8.4 APPLICATIONS OF THE STUDY

I. Digit letter substitution task (DLST):

The improvement in DLST performance following CM suggests that this practice may be useful in conditions associated with attentional deficits. There are widely differing conditions in which attention is impaired. These include slow learners, mentally challenged persons with various types of disorders, attention deficits and attention-deficit hyperactivity disorder (ADHD).

II. Letter copying task (LCT) and Circle dotting task (CDT):

The improved performance in this repetitive motor task following CM, suggests that CM practice can improve muscle performance for a repetitive task with a possible reduction in fatigue. This has widely ranging applications such as use of a computer keyboard, assembly systems in factories, as well as other tasks requiring greater precision.

III. Wechsler memory scale (WMS):

The improved performance in primary working memory on associate learning, suggests applications of CM practice in education, most white-collar jobs and prevention and perhaps management of certain degenerative conditions in which memory is affected.

IV. State anxiety inventory (STAI):

Decrease in subjectively rated state anxiety level following CM, suggests its’ usefulness in stress management and reducing anxiety.
V. Midlatency auditory evoked potentials (MLAEPs):  

Cortical level changes following CM support the applications mentioned above, i.e., CM may be useful in anxiety disorders and conditions associated with cortical arousal, one such condition could be epilepsy though it is necessary to keep in mind that CM practice includes certain āsanās where safety issues would have to be considered.

8.5 LIMITATIONS OF THE STUDY  
The chief limitation of this as well as most previous studies is that the assessments were made before and after the practice but not during the practice. Quite obviously the performance tasks could not be given to the participants during any yoga practice. In the case of MLAEPs recordings were not done during the practice as CM includes the practice of yoga postures and this was found to lead to movement artifact. An attempt was made to deal with this difficulty by testing whether telemetric measurements of MLAEPs would be artifact free. A telemetric recording on a small sample (n=6; unpublished data) showed that the evoked potential waveforms were contaminated with movement artifact. The other limitation of the present study was that there was no way to determine whether the participants had brief episodes of micro-sleep during SR. Apart from these two limitations both the design of the study and assessments have been used earlier and hence, there was no other major limitations.
8.6 SUGGESTIONS FOR FUTURE STUDIES

The present findings have suggested certain applications of the practice of CM in healthy individuals as well as in certain pathological conditions, e.g., anxiety disorders. Hence, future studies may assess the impact of CM in these populations.

Apart from this the decreased cortical activity following CM in the present thesis is based on evoked potential recordings. In order to get a more conclusive idea about whether cortical activity increases or decreases with CM, recordings of cerebral blood flow using various specialized techniques could be done.