THE EFFECT OF METTA MEDITATION AND TIME OF DAY ON THE CULTIVATION OF MINDFULNESS AND ATTAINMENT OF MENTAL COMPOSURE: A PHYSIOLOGICAL PARAMETERS PERSPECTIVE

R. Wijesiriwardana[1] and S. Ratnayaka[2]
[1]*Department of Electrical and Electronics Engineering, University of Peradeniya*
[2]*Department of Pali and Buddhist Studies, University of Peradeniya*

Introduction

This abstract discusses a research study carried out to understand the effectiveness of metta meditation on improving mindfulness meditation (open monitoring). According to the canonical discourses, the Buddha mentions Brahma-Vihara practice, starting with metta meditation accompanied by mindfulness meditation as one of the most effective ways towards enlightenment. Over the years this method has sprouted variations such as tranquility wisdom insight meditation. The research study also examines whether early morning hours (3-7am -- just after waking up) are better suited for the attainment of mental composure. According to the canonical discourses, Siddhartha Gautama was enlightened during the early hours of a Vesak full moon day around 2500 years ago. In addition, according to Buddhist meditation schools' general practices and the Vedic yogic practices (Brahma Muhurta), early hours are regarded as the time period most conducive to the cultivation of concentration. Further, most research on mindfulness-based meditation has focused attention on the object of meditation and the duration of meditation, together with the physiological and psychological parameters, but not considered the time of the day at which meditation takes place (Lutz, et al, 2008; Peng et al, 2004) . Even though experienced meditators may not have a preference on the time of day, for beginners selecting a time of day conducive to their mental composure becomes important.

Methodology

A group of beginner meditators who had completed a 10-day retreat were selected randomly and divided into four groups (3 persons per group) based on their habitual meditation patterns and were asked to participate in different combinations of meditative practice of metta and open

morning practice, All four groups were instructed to conduct their meditation according to the Brahma-Vihara Metta meditation practice and Anapanasati meditation as their open monitoring meditation practice during the experiment. The first group conducted their metta meditation in the morning prior to open monitoring meditation. The second group conducted their open monitoring meditation in the morning without prior metta meditation. The third and fourth groups conducted their open monitoring meditation for a minimum of 2 hours per day in the day or night (at their convenience) but with metta meditation prior to the open monitoring meditation and without metta meditation respectively.

In order to measure the progression of meditation by a coherent effect of physiological parameters, both qualitative and quantitative measuring metrics were used. After a 10 day retreat their ECG was monitored while they were undergoing open monitoring meditation. Progression of meditation was measured by using the relaxation response of heart rate (HR), heart rate variability (HRV), meditation depth index (MDI) and subjective qualitative data gathered by a questionnaire survey of the participants. Since progression of meditation depends on mental composure we assume that higher MDI is an indicator of higher mental composure. The ECG data collections were done until stable MDI values were obtained per participant in real time. Recent research studies have shown that the low frequency spectral density of the HRV data is an impartial and impersonal metric to measure the coherent effect of the progression of meditation (Wijesiriwardana, 2014; Lutz et al, 2008). Therefore we have monitored the HR of the meditators during the meditation by using a wireless PC based electro cardiogram (ECG) monitor. Then the HRV is estimated by using fast Fourier transformation and the normalized spectral density of the HRV was obtained. The MDI was then estimated by using the ultra-low and the low spectral powers of the HRV data. In addition, at the end of the meditation period, qualitative data (on items such as preferred time, length of meditation sitting etc) was collected based on a questionnaire.

The data collected was analyzed using multivariate analysis. The independent variables are the time of the day (morning hours or not) and the metta meditation before open monitoring meditation or not, resembling two binary variables “T” and “M” respectively. The MDI can

be considered as a linear function of T, M and combination of T and M (Equation 1). $MDI = f(T, M)$

According to the multivariate formulation, this can be rewritten as,

$$MDI = aT + bM + c(T * M) + D$$

where *a*, *b*, *c* are coefficients and *D* is a constant.

Results & Discussion

The results of the multivariate analysis are shown below.

$$MDI = 0.196T + 0.175M + 0.610(T * M) + 0.0145$$

As can be seen, positive values were obtained for the coefficients *a*, *b* and *c* A positive correlation of both metta meditation (M) and morning meditation (T) towards improving MDI during open monitoring meditation is observed. This indicates that both factors contribute to better mental composure. In addition, it was observed that both morning hours of meditation (T) and metta meditation (M) together contributed more to improving the participants mental composure, rather than T or M alone (since *c* was the largest coefficient value observed). Also it was observed that the early morning hours (T) for the meditation contributes somewhat more towards improving MDI than the metta meditation (M) (since $a>b$).

Conclusion

Since this initial research showed promising results, a more comprehensive controlled experiment followup is needed to widen our understanding of these factors.

References

Wijesiriwardana R. "Towards the Understanding of Samadhi or Zen State of Mind by Transient Heart Rate Variability Data" BUSLNC Anuradhapura Sri Lanka, Nov 8th 2014.

Lutz, A., Brefczynski-Lewis, J., Johnstone, T., and Davidson, R. J. (2008). Baune, Bernhard, (ed).. "Regulation of the Neural Circuitry of Emotion by Compassion Meditation: Effects of Meditative Expertise".

Benson H. “The Relaxation Response”, 1975.

Benson H. “The Mind/Body Effect: How behavioral medicine can show you the way to better health”, 1979.

Peng, C. K. , Isaac, C. H. , Mietus, J.E. , Hausdorff, J.M. , Khalsa, G., Benson, H., and Goldberger, A. L. “Heart rate dynamics during three forms of meditation” International Journal of Cardiology 95 (2004)19-27.