

sLORETA changes in specific brain regions during Meditation on Twin Hearts: Differences between novice and experienced meditators

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ABSTRACT

This study investigated the effects of meditation on Twin Hearts (THM) on subjects' sLORETA patterns in several specified brain regions. THM was subdivided into 7 sections based on the content of the meditation. Novice and experienced meditators EEG was collected while engaging in the meditation.

An examination of sLORETA current source density changes in gamma and alpha during the THM showed different activation patterns in specific regions of the brain. The patterns observed in experienced meditators was consistent with prior research showing increased gamma in regions related to empathy and focused attention. The novice meditators showed patterns of decreased activation consistent with other meditation practices such as TM (Travis & Shear, 2010).

BACKGROUND

- No previous research has been published on brain patterns during THM.
- Numerous studies have examined brain activation/deactivation patterns during other forms of loving-kindness (LK) meditations.
- research comparing experienced and novice meditators engaged in LK meditations from a Tibetan tradition showed significant increases in frontal-parietal gamma coherence and power (Lutz et al., 2004).
- Lutz, et al., (2008) demonstrated that LK meditations consistently activate specific brain regions known to be involved in the perception of another's emotional state.
- Two of these brain areas, the right anterior insula and the ACC, have been found to be related to empathy for others suffering and are activated in both novice and experienced meditators when they are engaged in a compassion meditation.

OBJECTIVES

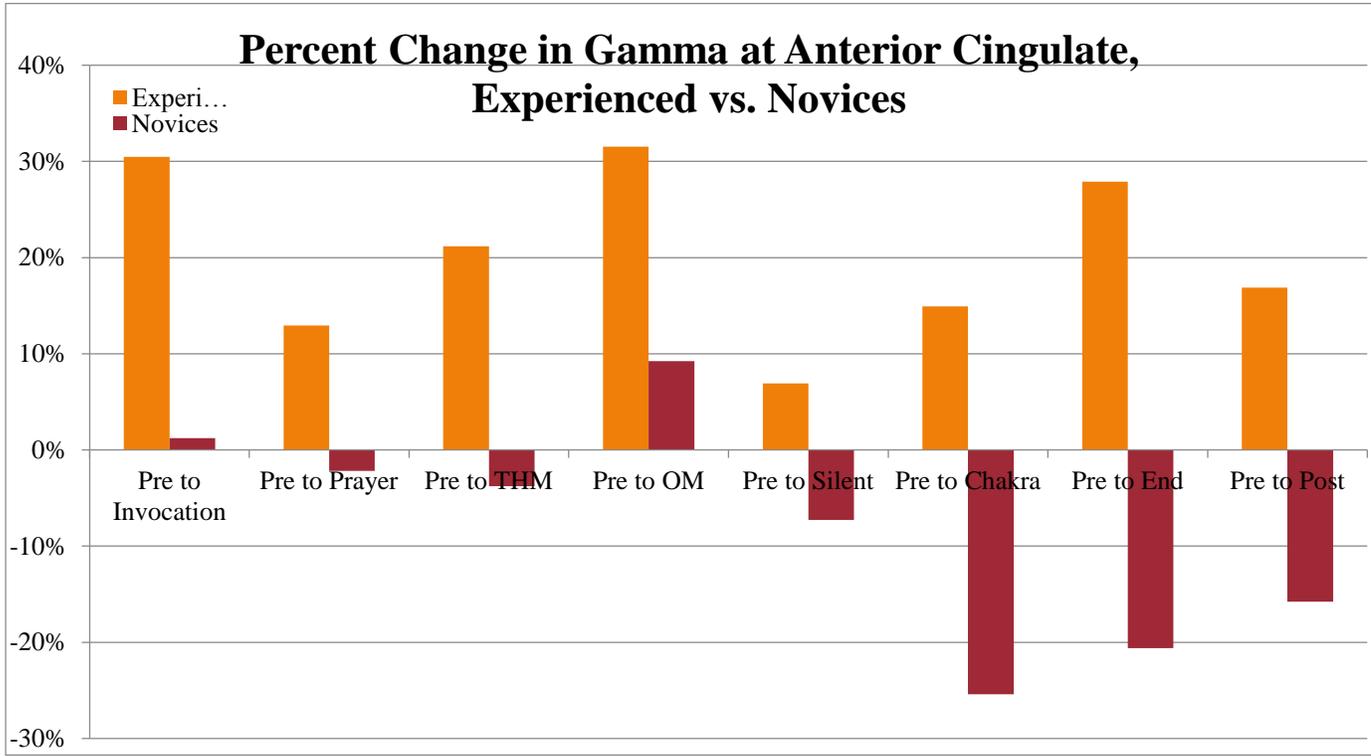
- To assess if THM induced brain changes are similar to those previously found in the literature
- To understand differences between novice and experienced meditators
- To consider the long-term impact of THM on brain functioning

METHODS

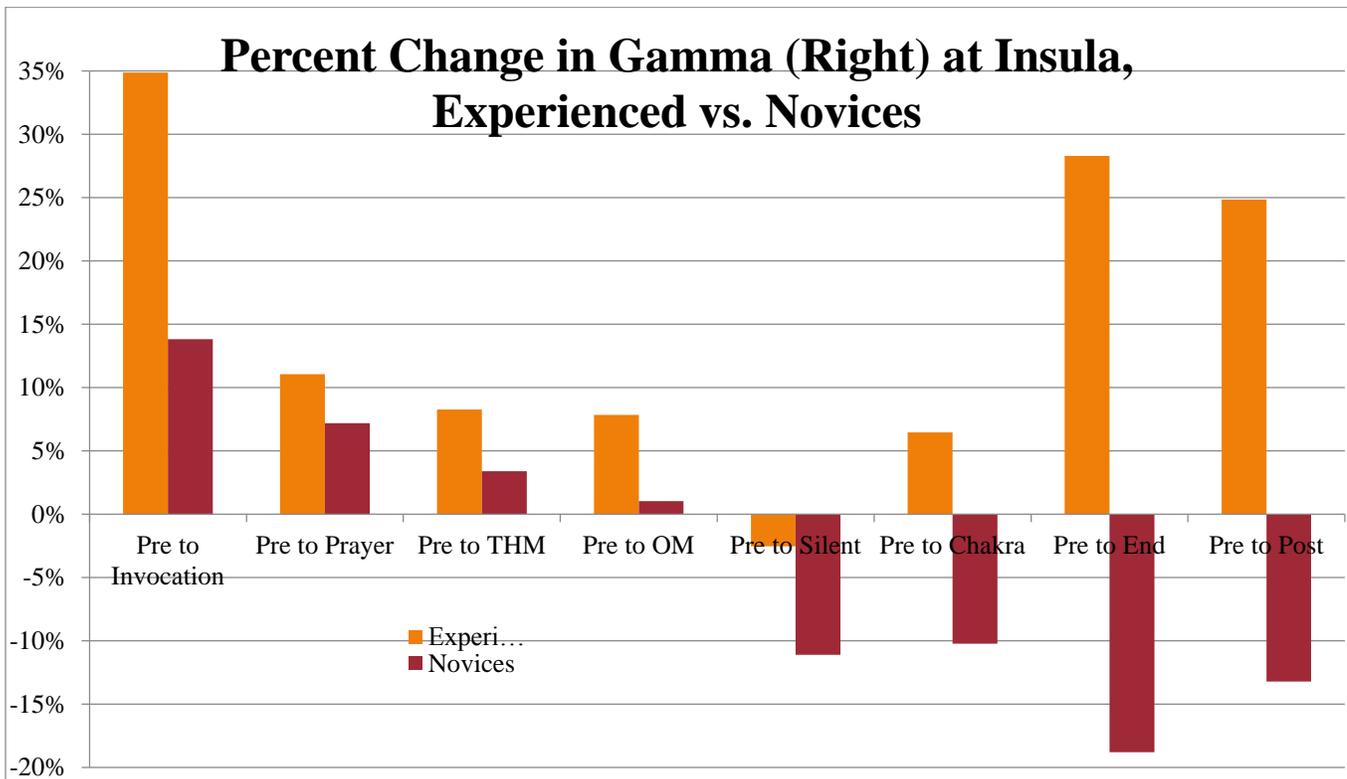
Subject Demographics	M	F	Avg. Age	Age Range	USA	Indian	Philipino	Korean	African	Mexican	Colombian	Guatemalan	Venezuelan
Experienced	4	8	45.42	24-64	3	3	4	1	1				
Novice	5	7	38.73	21-67	1		4		1	2	1	2	1

- Experienced meditators had at least 1,000 hours experience with Twin Hearts meditation (THM)
- Novice meditators had no previous experience with THM and no history of consistent meditation or contemplative practice
- Subjects completed questionnaires, Biofield Viewer imaging, P300 Qeeg analysis, and 19 channel EEG recording before, during and after listening to a 30-minute recorded version of the Twin Hearts Meditation for Psychological Self-healing
- For analysis, THM was divided into 7 segments based on the content of the meditation
- EEG recordings were conducted using a 19-channel fitted electrocap. A Brainmaster Discovery amplifier was used to record the data. Statistics were analyzed using STATA software. All data was artifacted prior to analysis to remove non-EEG influences such as eye blinks and muscle tension.

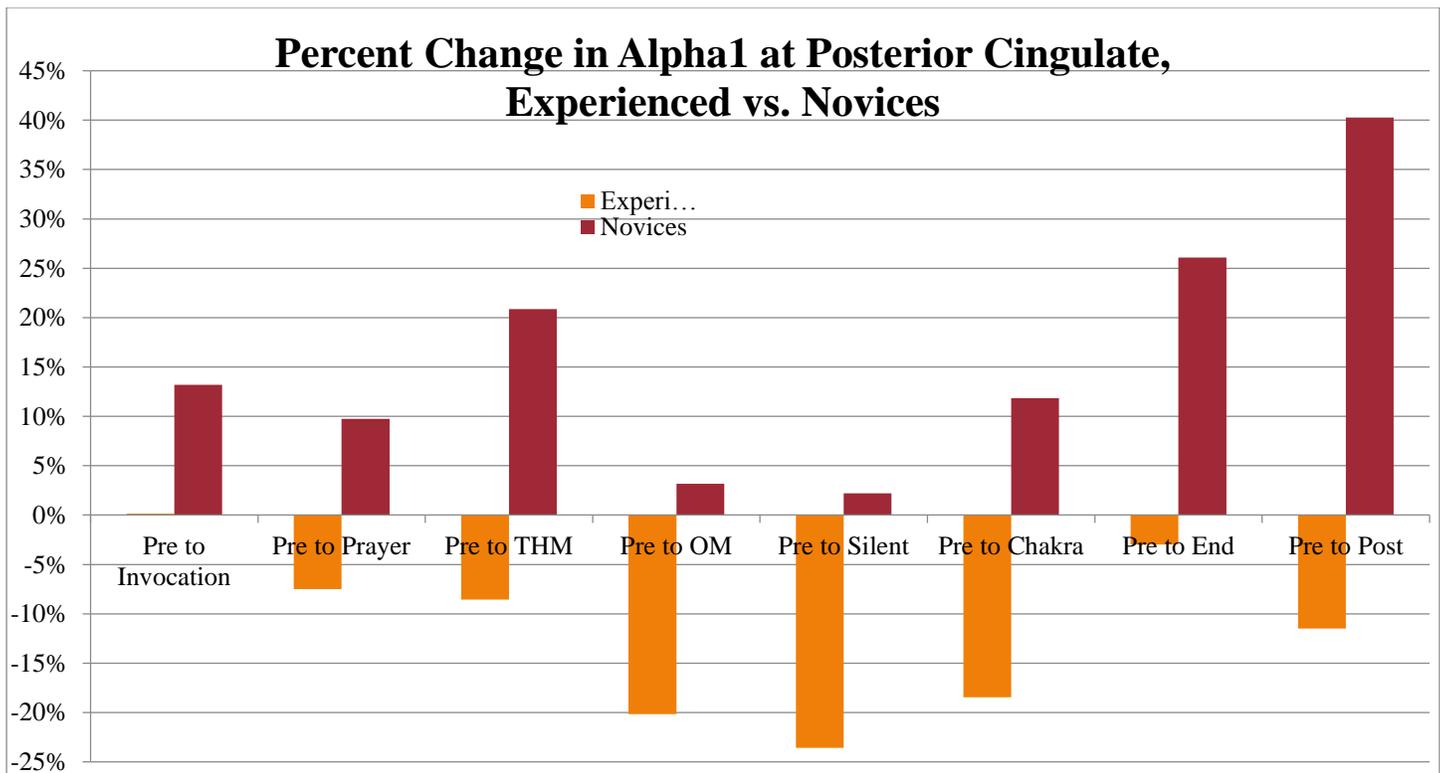
RESULTS



Experienced group showed statistically significant increases during OM* and end/blessing*. Novice group showed statistically significant decreases during chakra** and end**. *p<.10; **p<.05



Experienced group showed statistically significant increases in gamma at right Insula during end/blessing* and post*. Novice group showed statistically significant decreases during end**. *p<.10; **p<.05



Experienced group showed statistically significant decreases in alpha1 at PCC during OM* silent ** and chakra **.

Novice group showed statistically significant increases during THM**, end/blessing* and post**.

*p<.10; **p<.05

CONCLUSIONS

- At the ACC, experienced meditators increased gamma at all points of the meditation compared to baseline while novice meditators showed decreased gamma during the last 4 segments. This suggests that the experienced meditators demonstrated focused attention throughout, but particularly during invocation, OM and the end blessing. Novice meditators appeared to show a decrease in focused attention as the meditation progressed.
- At the right Insula, a similar pattern emerged to that observed at the ACC. Interestingly, the novice group showed increases at the beginning with a fairly linear pattern of decreased activation for the remainder of the meditation. Because the right insula is involved in emotion and tends to increase during lovingkindness meditations, these findings suggest that experienced meditators responded as expected while novice meditators may have had difficulty maintaining an emotional connection as the meditation progressed.
- At the PCC, novice meditators showed a consistent increase in alpha1 activity during the course of the meditation suggesting that their minds were becoming more relaxed, peaceful and silent. At the same time, the experienced meditators showed decreased alpha1 activity as their minds continued to remain active and focused on the details of the meditation.
- Novice meditators appear to be relating to the THM by quieting the mind and relaxing their attentional focus. Gamma decreases and alpha1 increases during different portions of the meditation suggest that they are relating to the meditation in a similar manner to automatic self-transcending meditations such as TM (Travis & Shear, 2010).
- sLORETA analyses of gamma activation in the ACC and insula along with Alpha1 changes in the PCC show that the experienced meditators are engaging with the meditation by increasing attention, focus and emotional responsivity. These results suggest that the THM meditation is experienced as a focused attention and lovingkindness meditation by experienced meditators.
- While other data collected during this study indicates that THM may be beneficial for all experience levels, it appears that longer-term meditators engage their brain differently and may consequently experience different benefits.

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