Electroencephalographic correlates of focused attention, open monitoring and loving kindness meditation in Theravada Buddhist monks

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Aim: contrasting EEG frequency and coherence patterns across different brain regions in focused attention meditation (FAM), open monitoring meditation (OMM) and loving kindness meditation (LKM) in long-term meditators.
Method: 20 Theravada Buddhist monks and novices of the Thai Forest Tradition and 20 matched control participants with short-term meditation experience (with 50 to 200 hours of meditation practice) took part. A non-meditative rest condition was alternated with FAM, OMM and LKM meditation forms in both groups.
Analysis: ANOVA with repeated measures: Group (Long-Term Meditators vs. Controls) x Condition (4 levels) x Dynamics (first half, second half) x Region (7 levels - frontal, fronto-central, central, centro-parietal, parietal, parieto-occipital, occipital) x Laterality (left, midline, right).
Preliminary analyses show that already during the resting state, the activity from the alpha band was reorganized in the long-term meditators (monks) as compared to controls. Specifically, slow alpha activity (8-12 Hz Hz) in the long-term meditators was enhanced as compared to controls and also manifested a strong frontalization as being expressed at both anterior and posterior electrodes. In contrast, in controls slow alpha activity at 9 Hz was overall significantly less pronounced. Also, alpha activity at 10 and 11 Hz in controls had the classical posterior distribution and was not present at anterior locations leading to prominent differences in the expression of fronto-central alpha activity between long-term meditators and controls. On the opposite, although fast alpha activity (13-14 Hz) was with a parietal distribution in both groups, it was larger in controls than in long-term meditators. This frequency-specific regional re-distribution of alpha activity in the long-term meditators persisted in different meditation states. In the group of long-term meditators, beta was equally suppressed for all meditation states as compared to the resting state at bilateral parietal and parieto-occipital sites, more strongly over the left hemisphere. Although in controls states of meditation also reduced beta activity as compared to rest, beta suppression was evident at frontal and fronto-central regions, mostly on the right and at the midline.
Our preliminary findings suggest that long-term meditation expertise modulate multiple brain rhythms across different meditation forms contrasted with a non-meditative rest condition, in different brain regions, in contrast with a control group with short-term meditation expertise.