EMG biofeedback training in adult attention-deficit/hyperactivity disorder: an active (control) training?

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Abstract

OBJECTIVE:
The present study aimed at revealing neurophysiological effects induced by electromyography (EMG) based biofeedback, considered as a semi-active control condition in neurofeedback studies, in adult attention-deficit/hyperactivity disorder (ADHD) patients.

METHODS:
20 adult ADHD patients trained their muscle activity in the left and right supraspinatus muscle over the course of 30 EMG biofeedback sessions. Changes induced by the EMG feedback were evaluated at a clinical and neurophysiological level; additionally, the relation between changes in EEG activity recorded at the vertex over the training course and changes of symptom severity over the treatment course were assessed in order to investigate the mechanisms underlying clinical effects of EMG biofeedback.

RESULTS:
Participants showed significant behavioral improvements on a self-rating scale. There was a significant increase in alpha power, but no significant changes in the delta frequency range; changes in the theta and beta frequency range were not significant after adjustment for multiple comparisons. No statistically significant correlation was found between changes in EEG frequency bands and changes in ADHD symptoms.

CONCLUSIONS:
The current results assessed by means of a single-electrode EEG constitute a starting point regarding a clearer understanding of mechanisms underlying clinical effects of EMG biofeedback. Although we did not reveal systematic effects induced by EMG feedback on brain activity it remains an open question whether EMG biofeedback induces changes in brain regions or parameters we did not gather in the present study (e.g. motor cortex).