Neurofeedback program using a portable EEG device based on alpha rhythms reduces perceived stress

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Résumé

Neurofeedback training is a relatively well-known procedure for enhancing cognitive functions and alleviating neuro-psychological disorders. However, its efficacy as stress self-management therapy remains unexplored. In this work, we evaluated the effect of melomindTM, a portable, user-friendly neurofeedback system on the perceived stress of 8 subjects in their work context.
The program included 8 neurofeeedback sessions of 21 minutes each for 1 month (2 per week). Neurofeedback exercises consisted in hearing natural landscape sounds with a superimposed sound modulated in real-time by user's alpha waves. For each session, two-channel electroencephalography (EEG) from parietal positions and stress auto-evaluation questionnaires were collected.

EEG signals were band-pass filtered between 2 and 30 Hz and segmented in 1-second windows. Artefactual segments were identified and automatically removed using a machine learning patented algorithm by myBrain Technologies, that was trained using a database containing thousands of examples of contaminated EEG. Several features, aiming at characterizing changes after the neurofeedback program, were then extracted from clean segments [1, 2].

Perceived stress was assessed by a numeric scale between 0 (full-relaxed) and 10 (full-stressed). This perceived stress was significantly lower both after each session and at the end of the program (51% of decrease in average). Furthermore, the analysis of EEG revealed significant changes regarding certain features in theta (4-8 Hz), alpha1 (7-10 Hz), alpha2 (10-13 Hz) and beta1 (13-18 Hz) bands.

These results suggest that a low-cost portable neurofeedback system as melomindTM can be successfully used for stress self-management in any environment.

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