

# Clinical and Biochemical Outcomes Following EEG Neurofeedback Training in Traumatic Brain Injury in the Context of Spontaneous Recovery

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## Abstract

It has been found that reduction of posttraumatic stress symptoms is positively associated with the reduction of postconcussive symptoms. Cortisol is commonly used as a biomarker of stress. Understanding the role of posttraumatic stress and cortisol in symptom reduction has implication for neuropsychological rehabilitation particularly in the context of spontaneous recovery.

**Objective:** The aim of the research was to study the effectiveness of EEG neurofeedback training on clinical symptoms, perceived stress, and cortisol in traumatic brain injury (TBI) patients in the context of spontaneous recovery.

**Methods:** The design was an experimental longitudinal design with the pre-post comparison. The sample comprised 60 patients with the diagnosis of TBI-30 patients in the neurofeedback training (NFT) group and 30 patients in the treatment as usual group (TAU) group. Half of the patients were recruited within 6 months of injury to study the role of spontaneous recovery and the other half were recruited in the 12 to 18 months postinjury phase. Alpha-theta training was given to the NFT group over 20 sessions. Pre and post comparisons were made on clinical symptom rating, perceived stress, and serum cortisol levels.

**Results:** The results indicate significant differences in symptom reporting and perceived stress between the NFT and TAU groups. Significant differences were also seen in cortisol levels with implications for the acute recovery phase.

**Conclusion:** Alpha-theta NFT has a beneficial effect on symptom reduction as well as perceived stress. It also has a beneficial effect on levels of serum cortisol, corroborating these findings.

**Keywords:** EEG; cortisol; neurofeedback; stress; traumatic brain injury (TBI).