Comparison of efficacy of two neurofeedback protocols: tetha suppress/betha increase and tetha suppress/alpha increase in improvement of cognitive functions in children with attention deficit-hyperactivity disorder

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Introduction: Attention-deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood. A series of studies has shown that neurofeedback is an effective additional or alternative treatment for children with ADHD. However, different neurofeedback protocols have been applied. In this study we aim to evaluate the efficacy of two neurofeedback protocols: tetha suppress/betha increase and tetha suppress/alpha increase in improvement of cognitive functions in children with ADHD.

Methods: In this randomized clinical trial, 60 children between 7-10 years were randomly assigned to one of neurofeedback groups (tetha suppress/betha increase or tetha suppress/alpha increase). Pre-training, post-training and follow-up assessment encompassed several behavior rating scales completed by parents.

Results: Both neurofeedback protocols caused reduction in total ADHD severity ($p<0.001$), hyperactivity ($p<0.001$), inattention ($p<0.001$) and omission error ($p<0.001$), but had no effect on Impulse and commission error. These effects lasted 8 weeks after treatment. There was no significant difference between two neurofeedback protocols in reducing the severity of the symptoms. Patients receiving alpha increase compared to beta protocol had higher reduction in omission error ($p<0.001$).

Conclusion: Both neurofeedback protocols are effective in improving hyperactivity and inattention symptoms and reducing severity of ADHD regarding the parents' reports and none were superior to the other protocol. However, increase alpha protocol has lower omission errors.

Keywords: Attention-deficit/hyperactivity disorder (ADHD); Neurofeedback; Clinical trial