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Administering the CPT/IVA to evaluate the effects of neurofeedback in ADHD

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Abstract:

Continuous Performance Tests (CPT) have proven effective for monitoring the effects of treatments for ADHD, especially neurofeedback and virtual reality. The Integrated Visual and Auditory Continuous Performance Test (IVA/CPT), which is based on the DSM-IV diagnostic criteria, allows hyperactive-impulsive symptoms and inattention to be assessed at the visual and auditory level. The goal of this study is to determine whether the IVA/CPT is a useful scale to measure the therapeutic efficacy of neurofeedback. A total of 16 male and female subjects ages 7-14 with a diagnosis of ADHD who had been randomly assigned to neurofeedback treatment participated in the study. Attention and hyperactivity were the variables evaluated in the pre- and post-treatment phases. Through comparisons of means and effect size calculation, the efficacy of neurofeedback was estimated according to the children's performance in the auditory and visual variables of the CPT/IVA. The data obtained reveal significant improvement in self-control and symptoms of inattention following the treatment.

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INTRODUCTION

Continuous Performance Tests (CPT), currently considered an alternative to paper and pencil tests, allow sustained attention and behavioral inhibition to be measured while allowing for the objective monitoring of therapeutic effects. They have proven effective for monitoring the change associated with treatments administered in ADHD (Madaan et al., 2008; Monastra, 2002; Epstein, 2001), especially neurofeedback (Arns, de Ridder, Strehl, Breteler y Coenen, 2009; Moreno et al., 2011) and virtual reality (Yan et al., 2008).

The Integrated Visual and Auditory Continuous Performance Test (IVA/CPT) (Sandford and Turner, 1995) which is based on the DSM-IV diagnostic criteria, allows hyperactive-impulsive symptoms and inattention to be evaluated at the visual and auditory level. It is administered from the age of 6 through adulthood and it takes 20 minutes. It has been used to evaluate attention and self-control problems (White, Hutchens and Lubar, 2005; Corbett and Constantin, 2006) and as an objective scale for measuring therapeutic effects.

In ADHD treatment, the IVA/CPT has been used to compare the effects of pharmacological therapy with respect to modifications in behavioral patterns (Harding, Judah and

Gant, 2003) and in relation to neurofeedback (Yan et al., 2008; Moreno et al., 2011), with significant differences detected on the principal scales (inattention and behavior control). Smith and Sams (2005) obtained significant changes in relation to inattentive symptoms in a group of adolescents with disruptive behaviors who were treated with neurofeedback. At the same time, when measuring therapeutic efficacy in a multimodal treatment (neurofeedback and cognitive therapy), Tinius and Tinius (2000) noted significant differences in inattention and behavioral inhibition among adults with ADHD (inattentive subtype) and a control group.

OBJECTIVES

To determine whether the IVA is a useful scale to measure the therapeutic efficacy of neurofeedback, a treatment administered to children diagnosed with ADHD.

METHOD

A total of 16 male and female subjects ages 7-14 with a diagnosis of ADHD who had been randomly assigned to neurofeedback treatment participated in the study. The minors were evaluated using the CPT/IVA.

RESULTS

Attention and hyperactivity are the two variables evaluated in the pre- and post-treatment phases. Through comparisons

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of means and effect size calculation, the efficacy of neurofeedback was estimated according to the children's performance in the auditory and visual variables (respectively) of the CPT/IVA. The data obtained in the study reveal significant improvement in self-control (FRCQ $t = -2.509$; $p < 0.05$) and with respect to symptoms of inattention (VAQ $t = -2.910$; $p < 0.05$) following the treatment. The results taken from the TE show values of between 1.03 and 0.69 and 0.80 and 0.57 for self-control and symptoms of inattention.

DISCUSSION AND CONCLUSIONS

CPT/IVA was confirmed as a useful scale to measure the therapeutic efficacy of neurofeedback. Medium and high effect sizes reflect the magnitude of the change between pre-treatment and post-treatment measurements.

The changes were observed in terms of both self-control and symptoms of inattention. The therapeutic effects can be seen independently of the type of stimulus presented (auditory or visual), although the data reflect that the change is greater when children are responding to visual stimuli.

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