



Deep rTMS In ADHD

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Objectives

Recent studies support the possible effectiveness of repetitive transcranial magnetic stimulation (rTMS) as a treatment for attention deficit hyperactivity disorder (ADHD).

The objective of this study was to evaluate the safety and possible efficacy of bilateral prefrontal deep rTMS for the treatment of adult ADHD.

Methods

Twenty-six adult ADHD patients were randomized blindly to sham or actual deep TMS (dTMS).

Twenty daily sessions were conducted using the bilateral H5 dTMS coil (Brainsway, IL) in order to stimulate the prefrontal cortex at 120% of the motor threshold with high frequency (Figure 1).

For assessment, Conners' Adult ADHD Rating Scale questionnaire and a computerized continuous performance test (Test of Variables of Attention) scores were been evaluated.

Results

In general, there were no between-group differences in any of the measures.

According to CAARS, the primary outcome measure was an improvement over time in both the actual therapy group and the sham therapy group, with no difference between the groups, as shown with (Figure 2): treatment, $F(1,20)=0.148$, $P=0.704$, $\eta^2_{\text{partial}}=0.01$; time, $F(1,20)=8.688$, $P<0.01$, $\eta^2_{\text{partial}}=0.3$; treatment x time, $F(1,20)=0.022$, $P=0.883$, $\eta^2_{\text{partial}}=0.001$.

As reflected in the main subscales, the TOVA total score revealed no improvement over time, a marginal difference between the groups, and no interaction was found, as shown with (Figure 2): treatment, $F(1,20)=3.36$, $P=0.08$, $\eta^2_{\text{partial}}=0.14$; time, $F(3,60)=1.267$, $P=0.29$, $\eta^2_{\text{partial}}=0.06$; treatment x time, $F(3,60)=0.16$, $P=0.92$, $\eta^2_{\text{partial}}=0.01$. However, Treatment was safe and there were no significant side effects.

Conclusions

The presented evidence does not support the utility of bilateral prefrontal stimulation to treat adult ADHD. Due to the small sample size, caution must be exercised in interpreting our preliminary findings.

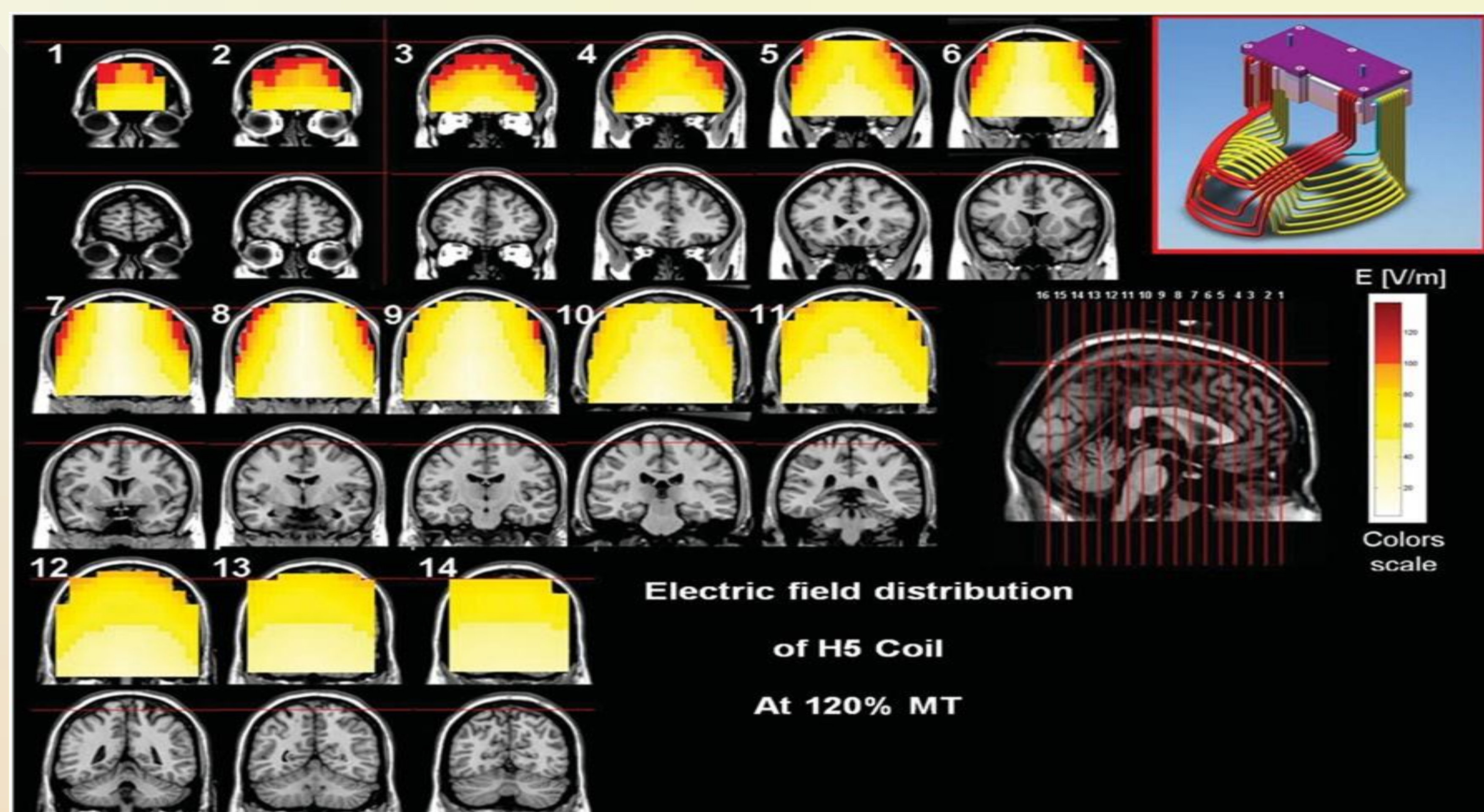


Figure 1. Colored field maps for the H5 coil, indicating the electric field's absolute magnitude in each pixel at 120% of motor threshold, for 14 coronal slices, 1 cm apart. Red pixels indicate regions with field intensity above the threshold for neuronal activation, which was set at 100 V/m.

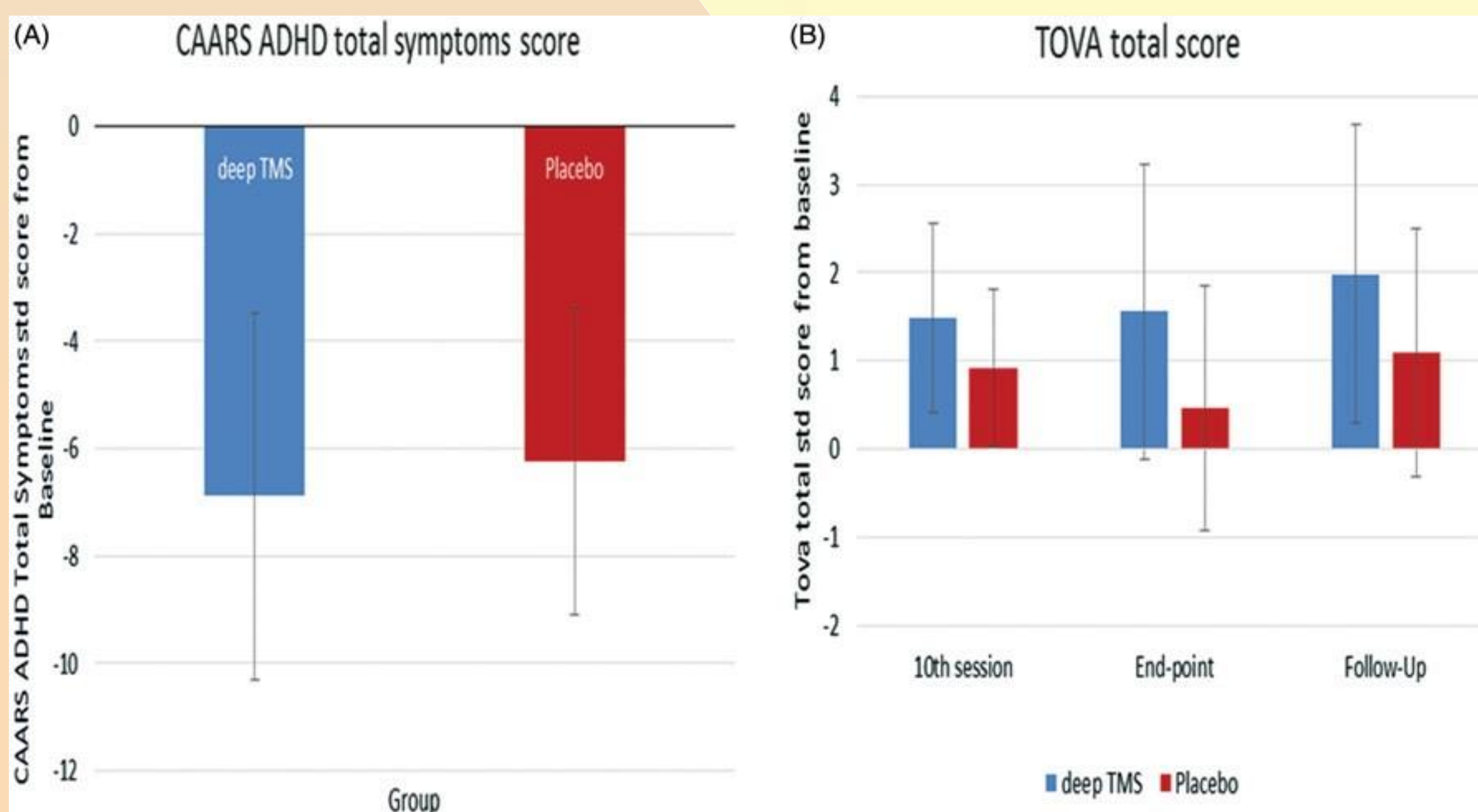


Figure 2. Conners' Adult ADHD Rating Scale (CAARS) questionnaire and the Test of Variables of Attention (TOVA) evaluations of adult ADHD (dTMS vs placebo). **(A)** According to CAARS ADHD total symptom standard score from baseline evaluations, the deep TMS treatment group (blue bar) did not differ from the sham/placebo group (red bar) in the averaged standard scores from the baseline. However, with both groups, the clinical symptoms were found to improve over time. **(B)** According to TOVA evaluations, dTMS treatment (blue bars) did not differ from sham/placebo treatment (red bars) in averaged standard scores from the baseline. No improved performances were found in either group over time.