

COMBINED TREATMENT OF EXERCISE AND TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS) ATTENUATES MECHANICAL HYPERALGESIA AND INCREASES CORTICAL BDNF LEVELS

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Introduction: Chronic pain management still remains a challenge due the refractory response to the drug treatment. Evidences suggest that the exercise plays an important antinociceptive role, as well as, the transcranial direct current stimulation (tDCS) therapy.

Methods: 78 male Wistar rats (60 days-old, 300g) were previously assigned in three groups: Control, Sham-Pain and Pain. On 15th day, groups were divided in 13 subgroups: Control, Sham-Pain; Sham-Pain+Exercise; Sham-Pain+Sedentary+Sham-tDCS; Sham-Pain+Sedentary+tDCS; Sham-Pain+Exercise+Sham-tDCS; Sham-Pain+Exercise+tDCS; Pain; Pain+Exercise; Pain+Sedentary+Sham-tDCS; Pain+Sedentary+tDCS; Pain+Exercise+Sham-tDCS; e Pain+Exercise+tDCS. Nociceptive response was assessed by von Frey (VF) test at: baseline, 7th and 14th days after CCI, immediately and 24h after treatment. Rats were subjected to exercise (20min/day/8days of treadmill) and/or bimodal tDCS (0.5mA/20min/day/8days) from 15th day to 22nd day. For sham-tDCS, the electrodes were put on the scalp and the stimulator was held switched off. At 48h after the end of treatment, rats were decapitated and tissues harvested for biochemical analysis. Behavioral data were analyzed by GEE/Bonferroni and biochemical data by One-way ANOVA/SNK, and $P < 0.05$ was considered significant. This experiment was approved by CEUA-HCPA (#17.0061).

Results: We observed interaction between group vs time upon mechanical hyperalgesia ($Wald\chi^2=1456,094$; $n=78$; $P < 0.05$). On 7th day after surgery, Sham-Pain and Pain groups exhibited lower nociceptive latency ($P < 0.05$). At 14th day after surgery, only Pain group displayed lower nociceptive threshold. Immediately following the last treatment session, the Pain-tDCS and Pain-Exercise groups displayed a nociceptive response partially decreased to the VF test ($P < 0.05$). The tDCS+exercise treatment decreases the nociceptive response compared to treatment alone ($P < 0.05$). In the cerebral cortex, there is increase in the BDNF levels in Sham-Pain+exercise+Sham-tDCS and Sham-Pain+exercise+tDCS, Pain+sedentary+tDCS, Pain+exercise+Sham-tDCS and Pain-exercise+tDCS groups compared to control group [$F_{(12,65)}=5.301$; $P < 0.05$].

Conclusion: This study showed that the pharmacological therapies could attenuate the nociceptive response and neurochemical parameters in chronic pain.

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