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Researches Classified – Panel Awards – Clinical

Non-invasive brain stimulation for negative symptoms in schizophrenia: an updated systematic review and meta-analysis

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Background: Schizophrenia is a mental disorder with significant social and economic burden. Although current pharmacological treatments are effective for controlling the positive symptoms, medications have small-to-no effect for the treatment of negative symptoms. Noninvasive Brain Stimulation (NIBS) techniques, such as transcranial magnetic stimulation (TMS), transcranial direct current stimulation (tDCS) and trigeminal nerve stimulation (TNS) are emerging as neuroplasticity enhancer, boosting treatment response for refractory symptoms in Schizophrenia.

Objective: To assess the efficacy of non-invasive brain stimulation for negative symptoms in schizophrenia in randomized clinical trials (RCTs).

Methods: A systematic review in the Medline and Cochrane Library databases was performed up to May 31, 2017. The primary outcome was the Hedges' g for continuous scores in a random effects model. Heterogeneity was evaluated with the I 2 and the χ2 test. Publication bias was assessed using the Begg's funnel plot. Meta-regression was performed using the random-effects model modified by Knapp and Hartung.

Results: We included 31 RCTs (n=1272); most with small-to-modest sample sizes. Active stimulation was significantly superior over sham for negative symptoms (Hedges' g = 0.23; 95% CI 0.11 – 0.34). The funnel plot and the Eggers test showed that heterogeneity and the risk of publication bias were low (I2 =2.3%, p=0.429 for the χ2 test; p=0.179 for the Egger's test). Meta-regression showed no influence of any variable on the results found. Both transcranial magnetic stimulation and transcranial direct current stimulation were superior to sham. In a subgroup analysis, no trial was alone responsible for the positive results observed.

Conclusion: NIBS active was superior to sham stimulation for the amelioration of negative symptoms in schizophrenia. We found no considerable heterogeneity or publication bias in our analysis, corroborating to the strength of our findings. Further RCTs with larger sample sizes are needed to clarify the precise impact of NIBS in negative symptoms in schizophrenia.

Keywords: Schizophrenia; Brain stimulation; Noninvasive brain stimulation; Randomized clinical trials.