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# Effectiveness of Transcranial Direct Current Stimulation in Reducing Attack Frequency in Patients with Chronic Migraine: A Meta-analysis

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## Research Aim and Key Result:

***Aim**: To evaluate whether transcranial direct current stimulation (tDCS) reduces the frequency of chronic migraine attacks compared with placebo.*

***Key Result**: tDCS significantly reduced migraine frequency by 3.4 attacks per month versus placebo ($p < 0.001$), with consistent results across studies.*

## Objective

Migraine is a disabling neurovascular disorder that strongly impacts quality of life. Searching for safer and more effective treatments, transcranial direct current stimulation (tDCS) has emerged as a non-invasive option, producing lasting effects with few adverse events. This study evaluated, through meta-analysis, the efficacy of tDCS compared with placebo in reducing the monthly frequency of attacks in patients with chronic migraine.

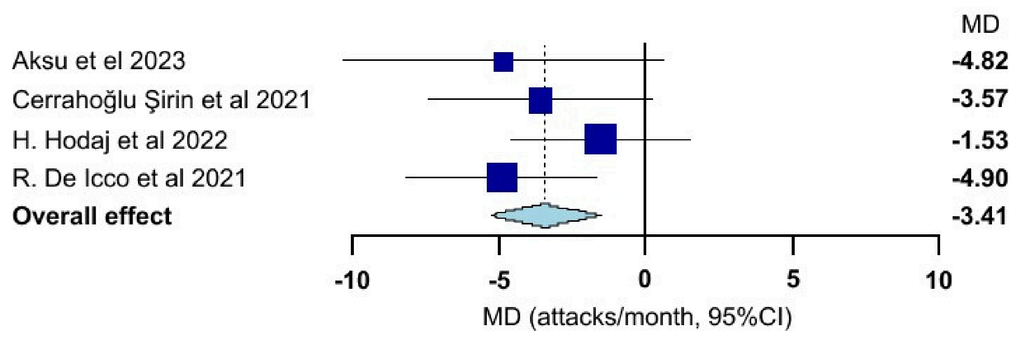
## Methods

This meta-analysis followed PRISMA guidelines and included randomized controlled trials published between 2020 and May 2025. Four studies were selected (n = 102), applying tDCS over the dorsolateral prefrontal cortex or motor cortex, with 1–2 mA for 10–15 sessions of 20–30 minutes. Studies of episodic migraine, combined therapies, or published before 2020 were excluded. Risk of bias was assessed with the Cochrane RoB 2.0 tool, and statistical analysis was performed with a random-effects model.

## Results

Compared to placebo, tDCS significantly reduced the frequency of chronic migraine attacks (mean difference: –3.41 episodes per month; 95% CI: –5.30 to –1.53; $p < 0.001$). Three of the four studies favored tDCS, two with statistical significance. Heterogeneity was null ($I^2 = 0\%$), indicating consistency among findings. These results support the potential of tDCS as a promising therapy for chronic migraine.

Meta-analysis forest plot: effect of tDCS on chronic migraine frequency




## Conclusion

Transcranial direct current stimulation significantly reduced migraine frequency in patients with chronic migraine, with consistent findings across the included studies. Despite these promising results, the small number of trials, heterogeneous protocols, and limited sample sizes highlight the need for further research to confirm long-term efficacy and safety.

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