

The Effect of Transcranial Direct Current Stimulation (tDCS) on sleep and insomnia : A Systematic Review

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Background:

Sleep is a fundamental physiological process that plays a crucial role in overall health and well-being. In recent years, transcranial direct current stimulation (tDCS) has gained considerable attention as a non-invasive technique for modulating brain activity. Its potential to influence sleep parameters, including sleep architecture, sleep quality, and sleep disorders such as insomnia, has been the subject of growing interest. This review paper aims to provide a comprehensive overview of the current literature on the effect of tDCS on sleep and insomnia.

Methods:

The current study consisted of a systematic review, conducted according to the guidelines of the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA). The initial records identified through the database search were 3020, out of which 2696 were removed due to duplicity, and 334 were moved forward for screening. 209 papers were removed due to insufficient details, 55 were shortlisted for the full-text screening, only 8 met our inclusion criteria and were included in the review.

Results:

The reviewed studies provide mixed evidence regarding the impact of tDCS on sleep in healthy as well as individuals with insomnia. Regarding sleep quality, subjective reports from individuals with insomnia have shown promising outcomes with tDCS interventions. Several studies have reported improvements in subjective as well as objective measure of sleep quality, reduced sleep latency, and increased sleep efficiency following tDCS sessions. According to our assessment tool (Cochrane Risk of Bias Tool), there was a high risk of bias in the majority of the studies.

Conclusions:

The review synthesizes findings from studies investigating the impact of tDCS on sleep architecture, sleep quality, and insomnia symptoms. The implications for future research, including standardization of stimulation protocols, personalized approaches, long-term effects, safety considerations, and combination therapies, are highlighted. Furthermore, the potential clinical applications of tDCS in the management of sleep disorders, particularly insomnia, are explored. By advancing our knowledge in this rapidly evolving field, this review paper aims to contribute to the development of evidence-based interventions that enhance sleep quality, improve insomnia symptoms, and promote overall well-being.