Meta-analysis of randomized controlled trials of cranial electrostimulation: efficacy in treating selected psychological and physiological conditions

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Authors' objectives
To assess the efficacy of cranial electrostimulation (CES) for the treatment of selected psychological and physiological conditions.

Searching
MEDLINE was searched from 1966 to 1991 using keywords such as the terms 'electronarcosis' and 'electric stimulation therapy'. The bibliographies of relevant studies and review articles were examined, as were the bibliographies of investigators of CES. The search was restricted to articles written in the English language.

Study selection
Study designs of evaluations included in the review Randomised placebo-controlled trials (RCTs) were included.

Specific interventions included in the review CES with sham treatment as control.

Participants included in the review Patients suffering from psychological and physiological conditions such as depression, anxiety, drug addiction, insomnia, headache, and other pain, were included.

Outcomes assessed in the review A variety of measures of anxiety, brain dysfunction, headache, insomnia, and operative pain were used.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The validity of the primary studies was assessed using the method proposed by Chalmers et al. (see Other Publications of Related Interest no.1). The reviewers were blinded to the results and the source of each study before scoring them for quality. The number of reviewers involved in this process was not stated.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were pooled within each target indication, using one outcome measure per study. The random-effects model of DerSimonian and Laird (see Other Publications of Related Interest no.2) was used to calculate the overall estimates of effect. The results were combined across different outcomes within each target indication. When trials did not report standard errors or standard deviations, a variety of methods were used to estimate such parameters, depending on the information provided.
How were differences between studies investigated?
The studies were grouped according to each target indication (anxiety, brain dysfunction, headache, insomnia and operative pain).

Results of the review
Nineteen RCTs (n=821) were included.

Anxiety.
Improvement occurred in 7 of the 8 studies that used a continuous measurement scale for anxiety, although the difference was only statistically significant in 4 of the individual trials. The pooled results showed CES to be statistically significantly better at reducing anxiety than the sham procedure, with an overall estimate of effect of -0.59 (95% confidence interval, CI: -0.95, -0.23; p<0.05). A sensitivity analysis, pooling data from 5 trials using a sham procedure that may have been more convincing, also demonstrated a statistically-significant difference in favour of the CES, with an overall estimate of effect of -0.54 (95% CI: -1.0, -0.08; p<0.05).

Brain dysfunction.
Two RCTs examined the role of CES for the treatment of brain dysfunction. No statistically-significant differences were demonstrated between the treatment and control groups.

Headache.
Two RCTs examined the treatment of headaches. Both trials showed a statistically-significant difference in favour of CES. Pooling the results from these trials gave an overall estimate of effect of 0.68 (95% CI: 0.09, 1.28; p<0.05).

Insomnia.
No significant difference was demonstrated between CES and a sham procedure in 2 RCTs examining insomnia, either individually or pooled.

Operative pain.
There was insufficient data in the 2 RCTs focusing on operative pain.

Authors' conclusions
Further trials are required. Such trials should be larger, report complete data and incorporate therapist blinding to avoid possible bias.

CRD commentary
The review's objective and inclusion criteria were clear and good details of the primary studies and methods of pooling were provided. The methods by which the primary studies were assessed for relevance and validity could have been clearer, providing information on the number of reviewers involved in each stage. Publication bias may be present in the review due to the search being restricted to English language articles only. In addition, the narrative interpretation did not always match the data presented in the figures, and combining data across different outcomes is not ideal (although the authors of the review did utilise a technique designed to give a conservative result).

Bibliographic details
Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.