Pulsed electromagnetic energy treatment offers no clinical benefit in reducing the pain of knee osteoarthritis: a systematic review

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CRD summary
The authors concluded that pulsed electromagnetic field therapy is unlikely to benefit patients with knee osteoarthritis. This was a well-conducted and reported review, and the authors’ conclusions are likely to be reliable.

Authors’ objectives
To evaluate pulsed electromagnetic field therapy (PEMF) for the treatment of patients with knee osteoarthritis.

Searching
MEDLINE, AMED, EMBASE, HealthSTAR, CINAHL, PEDro, SPORTDiscus and the Cochrane Controlled Trials Register were searched from 1966 to September 2005; the search terms were reported. In addition, the authors handsearched bibliographic references and abstracts published in special issues of specialised journals and conference proceedings, reference lists, presentations at scientific meetings and personal communications.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and controlled clinical trials were eligible for inclusion in the review. All of the included studies were RCTs.

Specific interventions included in the review
Studies that compared any type of PEMF or pulsed electrical stimulation with either standard treatment or placebo were eligible for inclusion. The included studies compared low frequency PEMF (3 to 50 Hz for 3 to 10 hours per week) or ‘pulsed short-wave’ high frequency PEMF (with shorter treatment duration) with placebo-controlled PEMF. The duration of treatment ranged from 2 to 6 weeks.

Participants included in the review
Studies of adults (aged over 18 years) with a clinically and radiologically confirmed diagnosis of knee osteoarthritis were eligible for inclusion in the review.

Outcomes assessed in the review
Studies that assessed pain or functional outcomes using validated self-report measures were eligible for inclusion. The review assessed outcomes immediately post-intervention. The included studies assessed pain using visual analogue pain scales (VAS) or the Western Ontario and McMasters University Osteoarthritis Index (WOMAC) Pain Scale; function was assessed using the WOMAC Physical Function Scale or the Arthritis Impact Measurement Scale (AIMS).

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

Assessment of study quality
Two reviewers independently assessed and scored study validity using the Jadad checklist; the maximum possible score was 5 points. Any disagreements were resolved by discussion, or through recourse to a third author.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data.
For each study, standardised mean differences (SMDs) with 95% confidence intervals (CIs) were calculated for pain and function. Data were extracted for the immediate post-intervention assessments. A priori, an effect size treatment difference greater than 0.2 was considered to represent a clinically important difference.

**Methods of synthesis**

How were the studies combined?  
The results from individual studies were discussed. An overall effect on pain and function was estimated using the weighted mean difference (WMD) and 95% CI.

How were differences between studies investigated?  
Differences between the studies were discussed with respect to the intervention. Statistical heterogeneity was assessed using the chi-squared and I-squared statistics.

**Results of the review**

Five RCTs (n=276) were included. The sample size ranged from 18 to 83.

Two RCTs scored 5 points for validity, one scored 4 and two scored 3.

None of the individual studies reported a statistically significant difference between treatments for pain. Only one study (n=83) with a low quality score of 3 reported a statistically significant difference between treatments in function (SMD -0.58, 95% CI: -1.02, -0.14).

For all studies combined, there was no significant difference between interventions in pain (WMD -0.66, 95% CI: -1.67, 0.35) or function (WMD -0.70, 95% CI: -1.92, 0.52).

**Authors’ conclusions**

PEMF is unlikely to benefit patients with knee osteoarthritis.

**CRD commentary**

The review addressed a clear question that was defined in terms of the participants, intervention, outcomes and study design. Several relevant sources were searched and attempts were made to locate unpublished studies, thus limiting the possibility of publication bias. It was unclear whether any language restrictions were applied. Validity was assessed, although only the composite score was presented; this makes it difficult to independently comment on the reliability of the evidence presented. Methods were used to minimise reviewer error and bias in the assessment of validity, but it was not clear whether similar steps were taken in the study selection and data extraction processes. The studies were combined using meta-analysis and the results from individual studies were discussed. The forest plot for function suggested the presence of heterogeneity, in which case meta-analysis might not have been an appropriate method for combining these studies. The review provided evidence of no statistically significant difference between PEMF and placebo (that may be due to the small numbers analysed) rather than evidence of no difference.

**Implications of the review for practice and research**

Practice: The authors stated that resources given to PEMF may be better utilised in providing more exercise classes and advice sessions.

Research: The authors did not state any implications for further research.

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