Ultrasound therapy in musculoskeletal disorders: a meta-analysis

Gam A N, Johannsen F

Authors' objectives
To evaluate the effectiveness of therapeutic ultrasound in the treatment of pain in musculoskeletal disorders.

Searching
Index Medicus from 1950 to 1966, and MEDLINE from 1966 to 1992, were searched using the keywords: 'ultrasound therapy' and 'ultrasonic therapy' combined with 'physiotherapy'. Papers in English, German, French, Swedish, Norwegian and Danish were retrieved. References from retrieved papers were also searched.

Study selection
Study designs of evaluations included in the review
Clinical trials comparing ultrasound with alternative treatment or a control group were included.

Specific interventions included in the review
Ultrasound therapy.

Participants included in the review
People with musculoskeletal disorders (lateral epicondylitis, bursitis of the shoulder, osteoarthritis of the knee, traumatised perineum, periarticularity humeroscapularis, shoulder pain after hemiplegia, ankle distorsion, breast pain after delivery, tendinitis of the shoulder and elbow, lower-back pain, myofascial pain).

Outcomes assessed in the review
Pain and functional ability (Visual Analogue Scale (VAS) and other pain scales, global preference, pain at pressure, analgetics usage, grip strength, wrist bending, functional capacity, McGill Pain Questionnaire, range of motion, walking distance, muscle strength) and X-ray (reduction of calcification).

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
Where available, the following information was abstracted from each trial: selection, inclusion and exclusion criteria and description of drop-outs, randomisation and blinding. The authors do not state how the papers were assessed for validity, or how many of the authors performed the validity assessment.

Data extraction
Each paper was independently reviewed by both authors, and the relevant information abstracted. Agreement was reached by discussion.

Methods of synthesis
How were the studies combined?
Two standardised effect sizes (d/r and d/s) were calculated for each study. D/r was obtained by dividing the difference between the ultrasound effect and the control group effect by the range of the outcome measurement used. D/s was obtained by dividing the difference by the standard deviation at baseline. The mean difference of the standardised effect size were then evaluated over all the studies. The methods were applied to ultrasound treatment versus sham-ultrasound, and as the results were not significant it was not applied to ultrasound treatment versus another treatment, or...
Results of the review
Twenty-two studies evaluating 1,953 patients across the various disorders were identified: 16 studies compared ultrasound with sham-ultrasound, whilst 6 compared ultrasound with non-ultrasound treatment or an untreated control group. Of the 16 studies, the data from 13 (1,065 patients) and 9 (883 patients) studies were used to calculate the two effect sizes in the meta-analysis.

Only 13 (9) studies of the 16 identified which compared ultrasound with sham-ultrasound provided data which enabled pooling using the d/r (d/s) statistic. The mean standardised effect size was 0.64% (95% CI: -6.7, +7.5) for d/r and 0.24 (95% CI: -0.02, +0.49) for d/s. As the results comparing ultrasound with sham-ultrasound were not significant, the comparison of ultrasound with non-ultrasound treatment or no treatment were not undertaken.

A t-test to assess the influence of blinding (sufficient versus insufficient) was not significant for d/r (p=0.78), but significant for d/s (p=0.009).

There was insufficient detail reported in the studies to assess the influence of proper randomisation or to undertake a dose-response analysis.

Authors’ conclusions
Given the analgesic effects of non-steroidal anti-inflammatory drugs in musculoskeletal disorders, the results of this meta-analysis indicate an unimportant effect of ultrasound treatment. There are problems in undertaking a meta-analysis of so many different musculoskeletal diseases, where ultrasound may have a different impact. However, although the pathogenesis varied, the cause of pains is to some extent always inflammation. No attempt was made to distinguish between acute and chronic disorders.

CRD commentary
This is a thorough review. However, not enough information on the various pain scales used in the primary studies is given. The literature searching was restricted to published studies only, and there is no mention of handsearching. More information on the individual primary studies would have been useful, rather than summary percentages over all studies. The statistical techniques used are not clearly explained, and it is not possible to tell from the review which studies were included in the meta-analysis.

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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.