Arm exercise training in patients with chronic obstructive pulmonary disease: a systematic review
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CRD summary
The authors concluded that arm exercise training programmes could improve arm exercise capacity, but their effect on dyspnoea, arm fatigue, and health-related quality of life was unclear. They acknowledged the limitations of conclusions based on a small number of trials. Their conclusions reflected the evidence presented, but potential methodological flaws in the review process mean that their reliability is unclear.

Authors' objectives
To evaluate the effects of an arm exercise training programme on symptoms, exercise capacity, and health-related quality of life in patients with chronic obstructive pulmonary disease (COPD).

Searching
MEDLINE, CINAHL, EMBASE, PEDro, and the Cochrane Library were searched, for relevant English-language articles from 1950 to June 2008; search terms were reported. The reference lists of all included studies, of relevant evidence-based practice guidelines, and of studies that were excluded from this review were scanned for additional studies.

Study selection
Randomised controlled trials comparing arm training with a control group, or a combined arm and a lower extremity training with lower extremity training alone, were eligible for inclusion. Eligible patients were those with COPD and those included had moderate-to-severe conditions. There were no predefined outcome inclusion criteria, but the primary outcomes were arm exercise capacity, dyspnoea and arm fatigue during activities of daily living, health-related quality of life, and dyspnoea and arm fatigue during arm exercise tests.

There was substantial variation amongst the included exercise protocols. Two used an arm cycle ergometer plus unsupported arm exercises and the others used unsupported arm exercises only. These included dowel lifts, hand weights, throwing a ball against a wall, passing a bean bag over the head, pulling on ropes and pulleys, or moving a ring across a wire. Intervention duration ranged from six to eight weeks, but there were variations in training frequency (once or twice daily); number of sets (one to three); and number of repetitions (three to 10). Progression was implemented after a predetermined period, or on the basis of symptom tolerance.

Studies were selected by one reviewer.

Assessment of study quality
Trial quality was assessed using the Physiotherapy Evidence Database (PEDro) scale, covering randomisation, allocation concealment, similarity of baseline characteristics, blinding, follow-up, intention-to-treat analysis, between-group analysis, and point estimates and variability. A maximum score of 10 was possible, with higher values representing higher quality.

Two reviewers independently performed the quality assessment.

Data extraction
Data were extracted by one reviewer to enable the reporting of within- and between-group differences.

Methods of synthesis
Trials were synthesised narratively, according to the outcomes of interest. Differences between the trials were reported in tables.
**Results of the review**

Five trials (n=157 patients) were included in the review. The mean PEDro score was 6.2 (SD 1.3). All trials included random allocation, with similarity of groups at baseline; used intention-to-treat analysis; and had measures of variability for at least one outcome. Other quality variables were inconsistently reported.

Four trials measured unsupported arm exercise capacity and two of them reported between-group differences that favoured the arm training. The remaining trial (n=28) reported improved supported arm exercise capacity resulting from arm training combined with leg exercises.

There were no between-group differences for dyspnoea during activities of daily living (two trials), health-related quality of life (two trials), or dyspnoea and arm fatigue during arm exercise tests (three trials).

**Authors’ conclusions**

Arm exercise training programmes improved arm exercise capacity, but their effect on dyspnoea, arm fatigue, and health-related quality of life was unclear.

**CRD commentary**

The review question was clear and the inclusion criteria were detailed for all aspects, except outcomes. The search strategy accessed some relevant sources, but the restriction to English-language articles means that relevant trials may have been missed and language bias could not be ruled out (despite the authors assertion that language bias was not an issue). The review process was conducted without the best attempts to minimise errors and bias; only the validity assessment was carried out independently by two reviewers. The validity assessment tool was appropriate for the included trial design, and the results were presented in detail. The method of synthesis was appropriate, given the clinical heterogeneity amongst the included trials. The authors’ correctly acknowledged the limitations of their conclusions, which were based on a small number of trials.

The conclusions reflected the evidence presented, but potential methodological flaws in the review process mean that their reliability is unclear.

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

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that larger trials were needed to evaluate the best training regimen for patients with COPD, using standardised training methodology. Their effect on activities of daily living should be measured as an outcome.

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