Effects of exercise training in patients with congestive heart failure: a critical review
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Authors' objectives
To review the effects of exercise training in reversing skeletal muscle abnormalities caused by congestive heart failure.

Searching
The search strategy included searching: MEDLINE from 1987 to 1993 and handsearches of more recent major journals in cardiology and cardiac exercise rehabilitation. A search of bibliographies of identified papers was undertaken.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), controlled trials and uncontrolled studies were included.

Specific interventions included in the review
Exercise training including walking, jogging, cycling, treadmill walking, arm ergometer, callisthenics, stair climbing.

Participants included in the review
Patients with congestive heart failure were included (n=174).

Outcomes assessed in the review
Improved exercise time; increased exercise performance; increased peak oxygen intake; increased in peak exercise blood flow; improvement in quality of life; changes in left ventricular ejection fraction (LVEF).

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 authors do not appear to have assessed the quality of the studies.

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 combined in a narrative review with a summary table. The RCTs were summarised separately from the non-randomised studies.

How were differences between studies investigated?
No.

Results of the review
Nine studies (patients=174) were included in the review: 3 RCTs, 1 controlled trial and 5 uncontrolled studies.

All but one of the 9 studies reviewed report positive gains from the exercise training. Increases in exercise time were...
noted in 4 studies. Increased peak oxygen intake was measured and reported in 6 of the studies. Quality of life was assessed in only 1 study which found post-interventions improvements in this measure.

Deterioration in left ventricular function as a result of the exercise training was reported by 1 poorly-designed study. The better-designed studies with standardised exercise programmes did not report similar deterioration.

**Authors' conclusions**
Review of the data suggests that exercise training in patients with congestive heart failure may lead to a reversal of skeletal muscle abnormalities, with associated improvements in functional capacity and quality of life.

Exercise training has been found to improve exercise capacity and reduce symptoms. While the safety of exercise training with this patient group has not been examined in detail, preliminary data do not indicate clear evidence of harm from exercise training. More long term RCTs with larger samples are required to confirm the feasibility, clinical benefit and safety of exercise training on this population.

**CRD commentary**
This is not a good quality review. The search strategy is limited, no (explicit) quality assessments were made of the identified studies. Only a narrative review was possible as the identified studies differed in the type of training, the clinical characteristics of patients, the outcome measures and the follow-up interval. All studies had small samples (range 10-46). As a result it is difficult to come to any firm conclusions or recommendations about the benefits of exercise training in reversing skeletal muscle abnormalities.

**Implications of the review for practice and research**
There is a need for more well-designed studies in this area.

**Bibliographic details**

**PubMedID**
7860930

**DOI**
10.1016/0735-1097(94)00428-S

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Clinical Trials as Topic; Exercise Therapy; Heart Failure /metabolism /pathology /physiopathology /rehabilitation; Hemodynamics; Humans; Myocardium /metabolism /pathology; Ventricular Dysfunction, Left /metabolism /physiopathology

**AccessionNumber**
11995001171

**Date bibliographic record published**
25/03/1996

**Date abstract record published**
25/03/1996
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.