Exercise rehabilitation programs for the treatment of claudication pain: a meta-analysis
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Authors' objectives
To identify the components of exercise rehabilitation programmes that were most effective in improving claudication pain symptoms in patients with peripheral arterial disease.

Searching
MEDLINE and Index Medicus were searched from 1966 to 1993 for English language trials. Bibliographies of reviews, textbooks and studies located through the primary search were also searched.

Study selection
Study designs of evaluations included in the review
All study designs were included. Three RCTs and 18 non-randomised and uncontrolled studies were included.

Specific interventions included in the review
Exercise rehabilitation programmes. Specific interventions included walking only or a combination of two or more of the following: walking, running, cycling, stair climbing, dancing, rope skipping, jumping, playing ball, heel raises, straight-leg raises, limbering up, sitting and standing, knee bends, dynamic leg exercises and static leg exercises. Duration of the exercise programme ranged from 4 to 48 weeks, frequency of exercise classes range from 1.5 to 10 per week and the location for the intervention was home, on-site or a combination of both.

Participants included in the review
Participants with claudication pain were included. The mean age was 62.8 years (range: 57.9 to 68).

Outcomes assessed in the review
Claudication pain was assessed using a treadmill test before and after an exercise programme. Studies were excluded if mean or individual times or distances walked to the onset of pain and to the maximal claudication pain were not reported.

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 state that they assessed validity.

Data extraction
The data were independently extracted by the principal investigator and a research assistant. Neither reader was masked to the identity of the authors or to the institution, but the research assistant was masked as to the purpose of the study.

Methods of synthesis
How were the studies combined?
Inverse-variance averages of the within study treatment effects were calculated. The variance of the change from pre-training to post training was not available. A correlation of 0.5 was assumed between pre-training and post-training values and the reported pre-training and post-training standard deviations (SD) were used to calculate the change variances, taking into account the weighted averages.
How were differences between studies investigated?
The results from RCTs, non-randomised trials and uncontrolled trials were analysed separately and then subsequently combined. A chi-squared test for heterogeneity was performed.

**Results of the review**
Twenty-one studies were included. The authors reported that in the 18 non-randomised and uncontrolled studies, there were a total of 548 participants in the exercise groups. In the RCTs there were a total of 23 patients in the exercise group and 21 in the non-exercise (control) group.

In the non-randomised/uncontrolled studies, distance to onset of pain increased 179% from 125.9 (SD 57.3)m to 351.2 (SD 188.7)m, p<0.001. Distance to onset of pain in the control group increased 122% from 325.8 (SD 148.1)m to 723.3 (SD 591.5)m, p<0.001.

In the RCTs, distance to onset of pain increased from 79.4 (SD 14.1)m to 230.2 (SD 71.0)m, p<0.001. Distance to maximal onset of pain increased from 111.3 (SD 59.5)m to 155.0 (SD 127.4)m, p=0.33.

The exercise groups demonstrated a 255.8 m greater increase in distance to maximal claudication pain than control (p=0.02); the distances increased by 314 m (from 226.3 (SD 74.7)m to 540.3 (SD 118.2)m, p<0.001) in the exercise group and by 58.2 m (from 197.3 (SD 93.1)m to 255.5 (SD160.8)m, p=0.39) in the control group.

**Authors’ conclusions**
The optimal exercise programme for improving intermittent claudication pain distances in patients with peripheral arterial disease uses intermittent walking to near-maximal pain during a programme of at least 6 months. Such a programme should be part of the standard medical care for patients with intermittent claudication.

**CRD commentary**
Selection was limited to English language trials only, thus important studies may have been missed. Most of the results and interpretations were based on the differences between the pre-training and post-training, instead of the difference in walking distance between the intervention and control groups. Thus the data summarised in this review is equivalent to data from observational studies, though very small randomised studies were included. Although some results were presented for the differences between the intervention and the control groups, it was unclear whether the results refer to the control groups in the randomised studies or all of the controlled trials. Furthermore, there were some discrepancies between data in the text and table 2. No information was given as to whether the control group was a ‘no intervention’ group or another intervention (i.e. drugs). The conclusions presented by the authors are not substantiated by the results of the review, whose methodology limits the usefulness of the information presented.

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