Effectiveness of exercise after PCI in the secondary prevention of coronary heart disease: a systematic review

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CRD summary
The review concluded that there was considerable evidence for the effectiveness of PCI plus exercise compared to PCI alone in the secondary prevention of coronary heart disease. The quality of the evidence base and potential for biases limit the reliability of the review. The authors’ conclusions may be too strong and should be interpreted with caution.

Authors’ objectives
To determine the effectiveness of exercise training or percutaneous coronary intervention (PCI) alone compared to PCI plus exercise training for the secondary prevention of coronary heart disease.

Searching
PubMed was searched to January 2010 for articles in English or German. Search terms were reported. Reference lists of retrieved articles and reviews were searched.

Study selection
Prospective and retrospective studies of PCI plus exercise versus exercise or PCI alone in patients with established coronary artery disease were eligible for inclusion. The exercise programme had to be clearly described. Multimodal programmes that included exercise were considered. Studies that used exercise as a rehabilitation programme after procedures such as bypass surgery were considered only if the PCI population results were reported separately. Eligible outcomes were mortality, restenosis, cardiovascular events and quality of life. Studies that examined surrogate markers were excluded. Guidelines and reviews were excluded.

The included studies considered PCI with or without stenting in combination with various forms of exercise therapy. Where specified, the exercise component of the intervention was initiated between four days and two months after the PCI. Intervention durations ranged from three to eight months and follow-up periods ranged from the end of the intervention to 12 months. One of the exercise components was part of a multimodal intervention. The control groups were PCI alone (there were no exercise alone groups). Patient ages ranged from 53 to 68 years. Trials were published between 1992 and 2009.

The authors did not state how many reviewers undertook study selection.

Assessment of study quality
Quality assessment was undertaken using the SIGN tool to appraise blinding, randomisation, baseline differences and drop-outs. Studies were rated as 1++ for high quality RCTs, 1+ for well-conducted RCTs, 1- for RCTs with a high risk of bias and 2+ for well-conducted cohort studies.

Two reviewers assessed quality independently.

Data extraction
Data were extracted on cardiovascular outcomes, mortality and quality of life.

The authors did not state how many reviewers extracted data.

Methods of synthesis
A narrative synthesis grouped studies by the comparison group.

Results of the review
Six studies were included (664 patients, range 38 to 247): five RCTs and one retrospective cohort study. One RCT scored 1++, two RCTs scored 1+ and two RCTs scored 1-. The cohort study scored 2+. Follow-up ranged from three to
The four studies that reported on major cardiac adverse events all showed significant reductions with PCI plus exercise compared with PCI alone. Six studies reported on restenosis, five studies showed significant reductions with PCI plus exercise and one study showed no difference. One RCT showed a significant benefit of PCI plus exercise in terms of quality of life but another trial found no significant difference.

**Authors' conclusions**
There was considerable evidence for the effectiveness of PCI plus exercise compared to PCI alone in the secondary prevention of coronary heart disease.

**CRD commentary**
Inclusion criteria for the review were broadly defined and a limited search of one database was undertaken. There was potential for language bias as only articles in English and German were included. Publication bias was not assessed and could not be ruled out. Attempts were made to reduce reviewer error and bias during quality assessment; it was not clear whether the same attempts were made during study selection and data extraction. Quality assessment indicated that the quality of the evidence base was variable. Little detail was provided to allow evaluation of the reliability of the primary study results.

Sample sizes were generally very small so the possibility of chance results could not be ruled out. There were considerable differences across the studies in types of intervention and study durations and outcomes and these limited comparability. The authors noted a high degree of compliance in the studies that was unlikely to be achieved in clinical practice and this limiting the generalisability of findings. Data were narratively synthesised, which seemed appropriate given the differences across the trials.

The quality of the evidence base and potential for biases limit the reliability of the review. The authors’ conclusions may be too strong and should be interpreted with caution. The call for further research appears warranted.

**Implications of the review for practice and research**
- **Practice**: The authors did not state any implications for practice.
- **Research**: The authors stated that studies were warranted to investigate the effectiveness of PCI plus exercise compared to exercise alone. The comparative effectiveness of different exercise strategies needed to be determined. The effectiveness of PCI plus exercise in under-represented subgroups warranted study.

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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.