Effect of exercise in the treatment of chronic low back pain: a systematic review, emphasising type and dose of exercise

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Authors' objectives
To evaluate the efficacy of exercise in the treatment of low back pain (LBP), with emphasis on dose and type of exercise as well as methodological quality.

Searching
Clinical trials published in full length and in English or Scandinavian languages were retrieved from electronic searches of MEDLINE and SPORT (1966 to November 1995). Keywords used were: back pain, backache, exercise, exercise therapy, prevention, prevent, physical education and training. Manual searches from relevant reference lists of earlier reviews, consensus reports and articles were undertaken.

Study selection
Study designs of evaluations included in the review
Randomised prospective studies. Trials were included if they contained at least one intervention group using exercise as the only treatment intervention. This criterion, exercise as the only treatment, allowed hot packs in the warming up phase, and ergonomic counselling if given in parallel with training.

Length of exercise interventions varied from 2 weeks to 3 months.

Specific interventions included in the review
Flexion and/or extension exercise, hyper-extension exercise, pull to neck exercise, extension to neutral position, pelvic floor exercise, pelvic tilt exercise, home massage, heat and massage and isometric flexion and extension exercise. The total number of exercise sessions ranged from eight to 270 and the repetition number per session ranged from 60 to 300. Exercise was compared to standard treatment, no treatment (waiting list) or placebo. Standard treatment included: ultrasound, hyperextension and pull to neck exercise, abdominal and back muscle exercise and encouragement for home exercise, soft tissue treatment with manual traction, co-ordination exercises, ergonomic counselling, and hot packs.

Participants included in the review
Participants had chronic or subchronic low back pain, with or without referred or radicular pain. Chronic LBP was defined as pain lasting greater than or equal to 3 months; subchronic LBP was defined as pain lasting greater than 4 weeks, together with at least three recurrent back pain episodes during the last 6 months.

Outcomes assessed in the review
Low back pain, loss of function on the individual level (disability) and loss of function on the social level (handicap).

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
Methodological quality was evaluated using the score instrument of Koes et al (See Other Publications of Related Interest), with three modifications. In the modified version, the total possible score was 103 points. Criteria covered study population, interventions, measurement of effect, and data presentation and analysis. Seven of the 16 criteria were directly related to internal validity, giving a maximum score of 39 points. These criteria covered: comparability of relevant baseline characteristics, adequate randomisation procedure, number lost to follow-up, co-interventions avoided, patients blinded, blinded assessment of outcome, and intention-to-treat analysis. Evaluation of methodological quality was conducted by two people, but these assessments were not independent of each other.
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?
Studies were combined narratively.

How were differences between studies investigated?
Tests for heterogeneity were not reported. However, the authors state that there was heterogeneity between studies due to methodological quality, sample studied, outcome measures, type of exercise, dose of exercises and type of control group.

Results of the review
Nine studies, comprising 932 participants were included in the review. Six studies evaluated the effect of exercise versus the effect of one or several control treatments (RCTs), and three trials compared the effect of different exercise interventions.

For the purpose of this review, positive effect of exercise was indicated by a significant reduction in pain level, disability level or handicap level compared to baseline measures.

A significant positive effect was found in favour of the exercise group in four of the six RCTs which compared exercise with controls. Among these four studies, exercise was significantly better than "standard" treatment in three studies, placebo treatment in one study, and no treatment (waiting list) in three studies. The remaining two RCTs showed no significant effect of exercise versus placebo control, nor versus the effect of "standard" treatment.

Of the three studies that compared the effect of different exercise interventions, one study found that in terms of spinal movement and pain experienced, the isometric flexion exercise group performed better than the dynamic flexion and extension exercise group, and the dynamic extension exercise group. The second study found that in terms of sagittal movement, the dynamic flexion exercise group performed better than the dynamic extension exercise group. There was no significant difference in frontal and transversal movement and pain experienced between these two groups. The final study compared intensive hyperextension exercise and pull to neck exercise and flexion exercise with a similar group that involved extension to neutral position (no hyperextended position). There was no difference between these two groups in terms of isometric endurance, ventral flexion of column, mobility, pain intensity or disability. Internal validity scores in the nine randomised studies varied from 7 to 26 points and from 31 to 68 on the total validity scale. The number of included RCTs was too small to allow the use of statistical analysis to assess whether variation in methodological quality could explain contradictory results between studies.

Authors' conclusions
Few RCTs evaluating the effect of exercise in the treatment of chronic and subchronic low back pain were retrieved. From the material included in this review, it is difficult to draw definitive conclusions about the effect of exercise in the treatment of chronic low back pain, nor whether methodological quality, dose of exercise, or type of exercise were important in determining reported results.

CRD commentary
The review focuses on a well defined question. Inclusion criteria were appropriate. The validity of included studies was adequately assessed, however, the number of included studies was too small for a sensitivity analysis to assess whether variation in methodological quality could explain contradictory results between studies. Sufficient detail of the individual studies was presented and the primary studies were combined appropriately.
The literature search could have been extended to include other databases, such as EMBASE and handsearching of relevant journals. Unpublished material was not included, and thus publication bias can not be ruled out.

The review is fairly thorough, but unfortunately due to heterogeneity, and the small number and low internal validity of included studies, a definitive conclusion about the efficacy of exercise in the treatment of low back pain could not be reached.

The authors mention two other reviews which focus on the effect of exercise on LBP (Koes et al, 1991 and Faas, 1996; see Other Publications of Related Interest).

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

Practice: The authors suggest that exercise interventions should emphasise functional exercises body awareness, practical ergonomic exercises and general fitness.

Research: The authors suggest that future research should address the problem of internal validity. There is a need for research evaluating exercise interventions grounded on established theoretical principles concerning exercise physiology and dose response. The rationale for the use of solely flexion and extension exercises in the treatment of LBP can be questioned. When focusing at improved function at the levels of disability and handicap, there might be a potential for exercise interventions employing a wider spectrum of exercises.

The authors state that several other authors have argued that an improvement in function is just as important as a reduction in pain. Consequently, future RCTs within this area should implement interventions based on known established theoretical framework concerning training for health, and exercises aimed at reducing or preventing risk factors associated with inactivity or immobilisation over a longer period of time.

**Bibliographic details**


**Other publications of related interest**


This additional published commentary may also be of interest. Stevinson C. Inconclusive evidence for exercise in treating chronic low back pain. FACT 1999;4:31-2.

**Indexing Status**

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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.