

# Review: Exercise therapy reduces pain and improves function in chronic but not acute low-back pain

Hayden JA, van Tulder MW, Malmivaara AV, Koes BW. Exercise therapy for treatment of non-specific low back pain. *Cochrane Database Syst Rev.* 2005;(3):CD000335.

Hayden JA, van Tulder MW, Malmivaara AV, Koes BW. Meta-analysis: exercise therapy for nonspecific low back pain. *Ann Intern Med.* 2005;142:765-75.

Hayden JA, van Tulder MW, Tomlinson G. Systematic review: strategies for using exercise therapy to improve outcomes in chronic low back pain. *Ann Intern Med.* 2005;142:776-785.

**Clinical impact ratings:** GIM/FP/GP ★★★★★☆☆ Phys Med & Rehab ★★★★★☆☆ Rheumatology ★★★★★☆☆

## QUESTIONS

Is exercise therapy effective in reducing pain and improving function in patients with nonspecific acute, subacute, and chronic low-back pain? What are the most effective components of exercise therapy in nonspecific chronic low-back pain?

## METHODS

**Data sources:** Cochrane Central Register of Controlled Trials (Issue 3, 2004); MEDLINE, EMBASE/Excerpta Medica, PsycINFO, and CINAHL (all to October 2004); references of relevant studies and reviews; and experts in the field.

**Study selection and assessment:** Randomized controlled trials (RCTs) that compared exercise therapy with no treatment or placebo, other conservative therapy, or another exercise group in patients with acute (< 6 wk), subacute (6 to 12 wk), or chronic (> 12 wk) low-back pain not caused by specific conditions. Quality assessment of individual studies was based on randomization, allocation concealment, follow-up, and blinding of outcome assessment.

**Outcomes:** Physical functioning and pain.

## MAIN RESULTS

61 RCTs ( $n = 6390$ ) met the selection criteria: acute (11 RCTs), subacute (6 RCTs), and chronic (43 RCTs) and 1 unclear. Outcomes were assessed at 6 to 12 weeks (short-term), 6 months (intermediate), and  $\geq 12$  months (long-term). In trials of chronic low-back pain, meta-analysis showed that exercise therapy improved function and pain outcomes more

than no treatment, placebo, or other conservative treatments at all 3 follow-up periods (Table 1). Meta-analysis of trials of subacute and acute back pain showed that exercise therapy did not differ from no treatment, placebo, or other conservative treatments in improving function and pain (Table 1).

**Table 1. Exercise therapy vs no treatment, placebo, or other conservative treatment for nonspecific low-back pain\***

Sample	Follow-up†	Function		Pain	
		Number of comparisons (n)	WMD (95% CI)	Number of comparisons (n)	WMD (CI)
Chronic	Short-term	17 (1370)	-1.75 (-2.94 to -0.56)	19 (1324)	-5.64 (-9.02 to -2.26)
	Intermediate	15 (1401)	-4.64 (-7.00 to -2.27)	16 (1261)	-8.42 (-12.98 to -3.86)
	Long-term	11 (1152)	-4.31 (-7.41 to -1.20)	11 (1032)	-6.97 (-12.69 to -1.24)
Subacute	Short-term	3 (515)	-0.31 (-4.22 to 3.60)‡	4 (544)	-2.46 (-6.91 to 1.99)‡
	Intermediate	4 (579)	-1.11 (-5.00 to 2.78)‡	4 (579)	-1.95 (-6.48 to 2.57)‡
	Long-term	2 (381)	-4.60 (-11.34 to 2.14)‡	2 (381)	-4.36 (-10.06 to 1.35)‡
Acute	Short-term	9 (1025)	-1.38 (-5.56 to 2.79)‡	10 (1097)	-0.03 (-1.40 to 1.34)‡
	Intermediate	5 (684)	1.52 (-0.72 to 3.76)‡	5 (686)	-0.44 (-5.11 to 4.23)‡
	Long-term	3 (511)	0.57 (-2.17 to 3.31)‡	3 (513)	-0.79 (-5.00 to 3.41)‡

\*WMD = weighted mean difference on a 0- to 100-point scale; CI defined in Glossary. A random-effects model was used.

†Short-term = 6 to 12 wk; intermediate = 6 mo; long term =  $\geq 12$  mo.

‡Not significant.

## COMMENTARY

Hayden and colleagues provide clinicians and payers with substantial guidance in treating the unfortunate 3% to 4% of the population afflicted with chronic, functionally impairing back pain: Structured exercise provides modest benefits in pain and functioning. Physicians have not always distinguished among the various types of exercise, and lumping types of exercise together makes no more sense than lumping various classes and doses of pharmaceuticals. We would not think of combining corticosteroids, nonsteroidal antiinflammatory drugs, and narcotics as “drugs” and consider them all to be similar. We must provide better advice to patients with chronic back pain about the most beneficial types of exercise and the optimal doses.

The review reinforces previous studies on the lack of benefit of structured exercise for acute low-back pain < 6 weeks in duration (1). If

there are no “red flags” on history or physical examination, such patients are best managed with analgesia, reassurance, and advice to return to normal activities. The level of reduction in pain and improvement in functioning for patients with chronic pain averaged over the various types and durations of exercises was found to be statistically significant but may not be clinically important. The level of pain improvement was only 7 points on a 100-point scale; a 10-point improvement correlates with patients reporting they are “slightly better,” and an improvement of 20 points correlates with feeling “much better” (2).

The greatest contributions of this review are the detailed sensitivity analyses and meta-regression indicating that exercise programs are not equally effective. Muscle strengthening and stretching exercises, individually directed and of long duration, may reduce pain by nearly 20

(continued on page 13)

To determine the effective components of exercise therapy for chronic low-back pain, the interventions were characterized by program design (individually designed, partially individually designed, and standard [same delivered to all participants]); delivery type (at home with initial meeting with therapist then no supervision or follow-up, at home with initial meeting with therapist then supervision and follow-up, attending exercise session with group supervision, and individual supervision with 1-on-1 intervention); dose or intensity (duration and number of treatment sessions); inclusion of additional interventions (e.g., advice to stay active, non-steroidal antiinflammatory drugs, and manual therapy); and types of exercises included (muscle strengthening, stretching, coordination, mobilizing or flexibility, aerobic exercises, and other specific exercise therapies [e.g., McKenzie exercise therapy, David Beck Clinic program, Cesar therapy, and Mensendieck therapy]). The characteristics of the interventions were entered into a meta-regression analysis. 43 RCTs provided data on 72 independent exercise groups and 31 control groups. Mean follow-up was 9.1 weeks. Using a reference treatment comprising a standard design, at-home, low-dose (< 20 h) exercise program with no addition-

al interventions, meta-regression analysis showed improved pain and function scores for individually designed exercise programs, at-home exercise programs with therapist supervision and follow-up, high-dose or high-intensity exercise programs, and programs with additional conservative care (Table 2). Of the specific exercise types, stretching exercises prompted the greatest improvement in pain and strengthening exercises the greatest improvement in function.

#### CONCLUSIONS

Exercise therapy is effective in improving function and reducing pain in patients with chronic low-back pain. Exercise therapy is

not better than no treatment or placebo or other conservative treatment for subacute or acute back pain. Individual components of exercise therapy programs make important contributions to improvements in pain and function. The most effective strategies are individually designed, supervised, and high-dose ( $\geq 20$  h) and have additional conservative therapy.

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**Table 2. Components of exercise therapy programs that improve pain and function in chronic low-back pain at mean 9.1 weeks<sup>§</sup>**

Exercise program components	Improvement in pain (95% CrI)	Improvement in function (CrI)
Individually designed	5.4 (1.3 to 9.5)	0.7 (-2.5 to 3.9)
Supervised home exercises	6.1 (-0.2 to 12.4)	1.3 (-2.1 to 4.8)
Individual supervision	5.9 (2.1 to 9.8)	3.2 (-0.6 to 4.8)
High dose ( $\geq 20$ h)	1.8 (-2.1 to 5.5)	2.1 (-0.6 to 4.9)
Additional conservative treatment	5.1 (1.8 to 8.4)	2.8 (0.6 to 4.9)

<sup>§</sup>CrI = credible interval. Values are change on a 0- to 100-point scale. Positive values indicate improvement.

#### COMMENTARY (continued from page 12)

points on a 100-point pain scale, a clinically significant improvement. The magnitude of the meta-regression results should be viewed as somewhat tentative since the authors did not perform these analyses with an a priori hypothesis on the superior type of exercise. However, a recent trial on chronic back pain found that a high-dose exercise intervention had outcomes similar to those of spinal fusion (3).

Future studies on exercise should focus on the more promising types of interventions described in this review, using clearly delineated protocols and careful descriptions of the dose and cost of the intervention. Focused trials may lead to improvements over previously reported outcomes, potentially placing structured exercise as the preferred treatment for chronic back pain. Practitioners should collaborate with physical therapists at the time of referral regarding the type of therapy to be administered, emphasizing the more effective interventions outlined in these reviews. Insurers can and should contribute to the use of effective

exercise programs through appropriate reimbursement of such programs and decreasing payment for interventions of marginal or no efficacy.

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