Exercise for Prevention of Recurrences of Nonspecific Low Back Pain
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Low back pain (LBP) is highly prevalent and a common reason for presentation to primary care. The direct and indirect costs associated with this condition are enormous and represent a significant economic burden to health care systems. The prognosis of those with acute LBP is generally positive, with approximately 72% recovering by 1 year. For those who recover, recurrences within the next 12 months following recovery are common. It has been well-established that nonspecific LBP is often recurrent and that 24% to 87% of those who recover from an episode of LBP will have a recurrence within 1 year.

A theme that is current among clinicians and researchers is the difficulty in defining a recurrence of LBP. Various clinicians and researchers define recurrence differently, which makes it difficult to compare the results of studies. What makes the definition of recurrence of LBP so difficult is the fact that a definition of recovery and a definition of recurrence are needed simultaneously. A patient can have a recurrence (ie, a new episode) only once he or she has recovered from the previous episode. A few definitions of recurrence of LBP have been published, and the definition provided by de Vet et al is probably the most commonly used. De Vet et al proposed the definition of a recurrence of LBP as the return of LBP lasting at least 24 hours following a period of at least 1 month without LBP (pain=0). Other less conservative definitions of recurrence and recovery also have been proposed such as Wasiak and colleagues’ definition that recovery is indicated by a lowering in the current symptoms where a patient no longer experiences atypical pain or pain-related difficulty in performing tasks and actions. Recurrence would then be a return of atypical signs and symptoms.

There is interest in preventing recurrent episodes because they are common, they may be more costly than the original episodes, and they can be as debilitating as an initial episode. Therefore, the prevention of such episodes may be an important component in the management of patients with LBP. Exercise therapies are one of the most commonly recommended treatments for patients with persistent nonspecific LBP with clear evidence for effectiveness, but it is unknown whether exercise is effective in the prevention of recurrences of LBP. Aiming to better understand the benefits of exercise, Choi and colleagues conducted a Cochrane systematic review (latest search July 2009) of randomized controlled trials evaluating the effectiveness of exercises on the prevention of recurrence of LBP (Table).

**Take-Home Message**

Thirteen articles reporting on 9 trials were included in the review. The exercise programs were divided into 2 types of interventions: (1) treatment interventions that were defined as “treatment for a current episode of back pain with the aim to prevent new episodes” and (2) posttreatment interventions that were defined as “interventions that were provided to patients after their regular treatment for an episode of back pain had been finished with the explicit aim to prevent recurrences of back pain.” To be included in the posttreatment category, trial...
Thirteen articles providing the results of 9 original randomized controlled trials were included in the review. All studies were published before July 2009.

Four studies had low risk of bias, 1 had high risk of bias, and 4 had unclear risk of bias.

Four studies (407 participants) evaluated posttreatment programs, and 5 studies (1,113 participants) evaluated exercise as a treatment modality.

**Posttreatment interventions**: Studies compared posttreatment intervention versus no intervention and posttreatment intervention plus TerapiMaster machine (Nordisk Terapi of Norway, Stauße, Norway) versus general exercises. The treatment interventions included stretching and strengthening exercises for the back, abdomen, and lower limbs and relaxation exercises plus education.

**Treatment interventions**: Studies compared exercise as a treatment versus usual care (education, analgesics, primary health care physician), exercise as a treatment versus sham treatment (sham ultrasound), and McKenzie exercises versus back pain education. The treatment interventions included general exercises, promotion of physical activity, multifidus muscle exercises, and McKenzie exercises.

The follow-up times were defined as short term (<6 months), intermediate (6 months–2 years), and long term (2-5 years).

### Posttreatment intervention

**Posttreatment intervention versus no intervention**

Pooled results of 2 studies demonstrated that posttreatment exercises significantly reduced the number of patients with recurrent LBP (risk ratio = 0.5, 95% CI = 0.3 to 0.7, n = 130); 22 of 67 patients in the exercise group and 41 of 63 patients in the no-intervention group had recurrent LBP, the number of recurrences (mean difference = −0.4, 95% CI = −0.6 to −0.1, n = 154), and the days of sick leave due to recurrent LBP (mean difference = −4.4, 95% CI = −7.7 to −1.0, n = 154). The results of single studies demonstrated that posttreatment exercise was better than no intervention for reducing time to recurrence at intermediate follow-up (hazard ratio = 0.4, 95% CI = 0.2 to 0.8, n = 69; 32% of patients in the exercise group and 65% in the no-intervention group had a recurrence by 600 days) and for reducing number of recurrences at long-term follow-up (mean difference = −2.0, 95% CI = −3.8 to −0.1, n = 66).

**Posttreatment intervention plus TerapiMaster machine (strengthening exercise equipment using ropes) versus general exercise**

The results of 1 study with 62 participants demonstrated no difference between the evaluated treatments for number of sick leave days (mean difference = −0.3, 95% CI = −0.7 to 0.04).

### Treatment intervention

**Treatment intervention versus usual care**

Pooled results demonstrated no difference in number of patients with recurrence at intermediate follow-up (risk ratio = 0.6, 95% CI = 0.2 to 1.8, n = 348; 113 of 174 patients in the exercise group and 124 of 174 patients in the usual care group had recurrent LBP) and long-term follow-up (risk ratio = 0.7, 95% CI = 0.4 to 1.6, n = 493; 154 of 257 patients in the exercise group and 147 of 236 patients in the usual care group had recurrent LBP). Single studies demonstrated no difference between the interventions for duration of recurrence (mean difference = −1.6, 95% CI = −3.6 to 0.4, n = 39) and number of recurrences at intermediate follow-up (mean difference = −0.2 to 1.2, n = 39; 3 of 20 patients in the exercise group and 8 of 16 patients in the usual care group were on sick leave).

**Treatment intervention versus sham ultrasound**

The results of 1 study with 154 participants demonstrated no significant differences between the evaluated treatments for number of patients with recurrent LBP at intermediate follow-up (risk ratio = 1.1, 95% CI = 0.9 to 1.2; 107 of 154 patients in the exercise group and 107 of 162 patients in the sham ultrasound group had recurrent LBP) and duration of recurrent LBP (standardized mean difference = −0.1, 95% CI = −1.0 to 0.3).

**Treatment intervention (McKenzie exercises) versus back school**

Pooled results (2 studies) demonstrated that McKenzie therapy was no better than back schools for reducing the number of patients with recurrence LBP at intermediate follow-up (risk ratio = 0.8, 95% CI = 0.4 to 1.4, n = 294; 89 of 182 patients in the McKenzie therapy group and 70 of 112 patients in the back school group had recurrent LBP). The results of a single study demonstrated that the McKenzie therapy group had fewer patients with recurrence of LBP at long-term follow-up (risk ratio = 0.7, 95% CI = 0.6 to 0.9, n = 89; 30 of 47 patients in the McKenzie group and 37 of 42 patients in the back school group had recurrent LBP) but that McKenzie therapy was no better than back school in decreasing the number of sick leave days due to a recurrent episode at intermediate follow-up (mean difference = −13.1, 95% CI = −30.8 to 4.6, n = 95) and long-term follow-up (mean difference = −19.8, 95% CI = −86.5 to 46.9, n = 93).

**Interpretation of results**: There was moderate-quality evidence that posttreatment exercise can prevent recurrences of LBP, although only 2 small-scale studies were included in the meta-analysis.

**Interpretation of results**: There was unclear evidence on the effectiveness of exercise as a treatment modality. All pooled analyses of this treatment modality included a maximum of 2 studies, with 1 study clearly favoring exercises and the other study showing no difference between treatments that ultimately led to a nonsignificant pooled result. Other large-scale and high-quality randomized controlled trials are needed to clarify the findings of this review.

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Note: 95% CI = 95% confidence interval.
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Evidence to a Patient With LBP

Can exercise help this patient?

“Ms B” is a 55-year-old woman with a 7-year history of recurrent LBP. She had a laminectomy and fusion of L5/S1 four years previously because of radicular symptoms. She experiences 3 to 4 episodes of LBP per year, and each episode lasts approximately 3 weeks. Three weeks previously, she experienced another acute episode, which occurred after swinging a large briefcase over her shoulder. The pain was located in the right lower back and radiated into the right buttock. Ms B described the pain quality as throbbing and aching, and she rated the intensity, on average, as 5/10 on a 0 to 10 numeric rating scale (NRS). Her current pain intensity was rated as 3/10. The pain woke her when turning in bed. It was aggravated by twisting (right or left) and prolonged sitting (>10 minutes). Her pain was eased in lying and standing positions.

Ms B completed, at the time of initial assessment, the STarT Back Screening Tool (SBST), which is a tool used to allocate patients to different treatments based on their prognosis (low, medium, or high risk or poor prognosis). She also completed the Oswestry Disability Index (ODI), which is an LBP-specific questionnaire to evaluate pain-related disability. The SBST suggested minimal intervention (2/9) and a good prognosis. The ODI score characterized her current disability as minimal (20/100). Neurological examination of the lower limbs was normal. The physical examination (active and passive mobility tests) revealed impairments in spine mobility and control of deep and superficial trunk muscles. The working diagnosis was recurrent nonspecific LBP. Ms B’s primary goal was to minimize the number and impact of recurrences.

Summary of Management and Follow-up

Treatment intervention to control pain and disability. For her current episode of LBP, Ms B was recommended to remain active within her tolerance of pain and gradually increase her activity weekly. In addition, spinal manipulation was provided once weekly for 3 visits. At her 6-week follow-up, Ms B’s pain intensity (on a 0–10 NRS) decreased from 5 to 1. Her ODI score (0–100) decreased from 20 to 6. Both changes were above the minimal clinically important difference reported for pain (2 points) and disability (6 points). Thus, she was classified as recovered based on her current episode. Because preventing or minimizing recurrence was a goal...
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of Ms B, we then implemented a posttreatment exercise program as described below.

Posttreatment intervention to minimize recurrence. Ms B was given a structured exercise program to perform after symptoms of the current acute episode had subsided. This exercise program included a gradual increase in the frequency and duration of cycling, as well as the following exercises 3 times per week: abdominal side plank on both sides (2 sets, 5 repetitions with a 5-second hold), bridge on ball (2 sets, 10 repetitions), and standing hip hike on both sides (2 sets, 8 repetitions). In addition, Ms B was provided a lumbar spine range-of-motion exercise in 4-point-kneeling (cat-cow exercise). These exercises were chosen based on the muscle function impairments identified during the assessment of her most recent episode. Ms B also was encouraged to re-engage with other activities she enjoys such as hiking and Pilates. Two and 4 weeks following discharge, Ms B returned for follow-up visits to make sure she was performing the exercises correctly. Three months postdischarge, Ms B was telephoned to discuss the program and offered the opportunity for additional follow-up. Ms B did not feel she needed follow-up and reported generally adhering to the posttreatment exercise recommendations.

Response to posttreatment intervention. One month and 1 year after discharge from active treatment, Ms B’s pain intensity remained at 1/10. The ODI also remained at 6/100 at the 1-month follow-up and further decreased to 4 at the 1-year follow-up. Ms B reported no exacerbations (pain that lasted more than a few minutes and did not interfere with function). Qualitatively, Ms B reported that this has been the first time she has consistently performed “specific exercises” for her back outside of a recurrence.

How did the results of the Cochrane review apply to Ms B? After assessing Ms B, her clinician asked the following question: For patients with chronic nonspecific recurrent LBP, is exercise better than no exercise or other forms of exercise in reducing the number of recurrent episodes? The clinician then conducted a literature search using the PICO (Patient, Intervention, Comparison, Outcome) elements and identified the systematic review by Choi et al.15

Patients: The systematic review included adult patients with nonspecific LBP or with recurrent LBP like Ms B.

Intervention: The review considered the impact of exercise performed during a recurrent episode and following resolution of that episode on recurrence of back pain. Based upon the review, the clinician considered that prescribing exercise while Ms B was experiencing a recurrence of symptoms may not have any value in reducing the likelihood of recurrence. However, participation in exercise once she had recovered from the current episode may be protective. The clinician, therefore, prescribed a range of home exercises to be performed following discharge. Ms B reported that she had continued to perform both the specific and nonspecific exercises recommended since recovering from her recent episode.

Comparison: The review suggests that posttreatment exercises are better than no exercises in reducing the number of recurrences. Thus, Ms B was encouraged to perform a structured exercise program after discharge.

Outcomes: Ms B’s primary goal was to reduce the number of recurrent episodes. The identified systematic review suggests that postintervention exercises can significantly decrease the number of recurrences for patients with her condition. After the treatment of the episode and performing her posttreatment exercises after discharge, at the 1-year follow-up, Ms B had not experienced a recurrence, whereas her previous history was 3 to 4 recurrences per year. Given that Ms B had not changed her work or commenced any other preventative treatment beyond the exercise, it is reasonable to attribute her good outcome to the exercise program. However, other possible explanations for this recurrence-free period include a placebo effect, natural history, and regression to the mean.

How well do the outcomes of the prevention provided to Ms B match those suggested in the review? Ms B made a good recovery from her most recent recurrence of LBP, as indicated by the measured improvements in pain and disability. Over the course of the next year, her pain and disability remained minimal, and there was no recurrence. These outcomes may be attributed to the exercise program she maintained and are consistent with the results of the review that suggested that an exercise program instituted following an episode of LBP may reduce number of recurrences.

Can we apply the result of the review to Ms B? The results of the review suggest that posttreatment exercises are effective in reducing the number of recurrences in patients with chronic or recurrent nonspecific LBP. As the participants of the different randomized controlled trials included in the review were somewhat heterogeneous (patients both on and not on sick leave, patients with and without current pain), it is difficult to
draw conclusions regarding whether the exercise intervention suits patients with specific characteristics. In this case study, Ms B was working and had moderate levels of pain and mild disability. The SBST score demonstrated that she was likely to recover from this episode with minimal intervention. It is not known whether a good prognosis for recovery within an episode is likely to change the number or intensity of recurrences. It is possible that an uneventful recovery also may be protective against recurrence. However, the systematic review included a broad range of patients with various levels of pain and disability, and, on average, posttreatment exercise appears to be protective for the number and severity of recurrences.

As with much of the literature on exercise interventions, parameters can be vague. The prescribed posttreatment exercises for Ms B did not precisely match the exercise parameters in the systematic review. However, the literature on exercises for the treatment of LBP does not favor one exercise approach over another.13,23 Because the type of exercise and parameters to be prescribed are unclear, Ms B chose to modify the prescribed intervention in a manner that suited her lifestyle. The ability to adhere to an exercise program is what is perhaps most important.

What can be advised based on the results of this systematic review?

It is recommended that the emphasis on exercise for prevention of recurrences should likely be shifted toward posttreatment exercise adherence. Mechanisms of LBP and how various interventions affect recovery and recurrences remain unclear. However, exercise is the most consistent intervention in optimizing recovery from LBP, and this systematic review suggests exercise also is likely effective in minimizing the number and severity of recurrences. The precise parameters needed to achieve this effect or the appropriate dose to achieve the desired outcome are not yet known.

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References

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