EXERCISE THERAPY FOR LOW BACK PAIN: A NARRATIVE REVIEW OF THE LITERATURE

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ABSTRACT

Purpose: Exercise therapy has become an expected modality in the treatment of low back pain but there are no clear evidence based guidelines available. The purpose of this review is to analyze the available literature in regard to demonstrated efficacy of various types of exercise therapy for low back pain.

Method: A search was made on PubMed for exercise and low back pain that found 28 citations in English including 23 randomized controlled clinical trials published between 1993 and 2004 and 5 literature reviews published in 2000 through 2002.

Results: Previous reviews have stated that the literature does not support the use of exercise therapy for acute low back pain but it does give qualified support to exercise therapy for chronic low back pain. More recent studies have divided subjects based on functional rather than temporal characteristics, specifically, taking into consideration the directional preference of the patient and addressing muscle groups that augment stabilization of the "neutral zone." Such approaches yield effective clinical response in both acute and chronic patients within 2 weeks with 6 visits and provide lasting benefit up to 3 years after intervention.

Conclusions: By identifying specific functional characteristics of individual patients, providers should be able to design exercise therapies that will provide more effective clinical intervention for low back pain patients. (J Chiropr Med 2006;5:38-42)

Key Indexing Terms: Exercise Therapy; Low Back Pain; Review Literature

INTRODUCTION

Chronic low back pain is a major cost driver in terms of medical treatment and long-term disability¹. The currently accepted general guideline is that prevention is better than cure. Conservative treatment is preferable to invasive therapy. Patients who have back surgery are more likely to need a second and a third surgery at some time in the future than those who have avoided surgery.² The 10-year outcome for patients with stenosis or herniated discs including those with radicular symptoms is similar whether surgery has been performed or not.^{3,4} Apparently, encouraging conservative treatment and avoiding surgery when possible should be a primary focus of comprehensive plans of wellness and cost containment for lower back pain.

The emphasis in managed care on therapies that involve active patient participation such as exercise therapy, as opposed to passive therapies such as ultrasound, manipulation and massage, is derived in part from an attempt to prevent over-dependence on the provider. Over-dependence on the provider is thought to de-motivate learning of self-help techniques and increase costs by unnecessary trips to the provider when home-care/self management techniques may be just as, or more, effective than office based procedures.

The response to managed care emphasis on active therapies has spawned the growth of rehabilitative exercise programs in physical therapy, occupational therapy, and chiropractic offices. But the type of exercise utilized varies widely from provider to provider depending on their professional orientation, training, and individual clinical experience. Because of the proliferation of active exercise therapy programs, these therapies are beginning to be recognized as major cost drivers in low back pain treatment. Additionally, as one delves into the literature, the support for exercise therapy as a panacea for back pain is not as strong as we might hope.

Exercise therapy describes active physical effort by the subject as opposed to passive therapies that re-

quire no active participation by the subject. Exercise therapy as a term encompasses a wide variety of activities. They can be grossly defined by 4 or 5 sub-categories categories of 2 general categories (Fig 1).

Back pain is certainly not the only reason to exercise. Acknowledging that there are many good reasons to pursue a course of exercise, including improved cardiovascular fitness, mood, self esteem and improved sports performance, this article will focus on the literature specific to exercise therapy for the treatment and prevention of lower back pain.

METHODS

A search of PubMed for exercise and low back pain found 26 citations in English including 23 randomized controlled clinical trials published between 1993 and 2004 and 5 literature reviews published from 1996 through 2002 regarding exercise therapy for low back pain.⁵⁻⁹

DISCUSSION

A systematic review in 2000 by van Tulder et al⁷ looked at 61 studies from 1966 through 1998 and concluded, "Specific exercises are not recommended for patients with acute and chronic low back pain. Exercises may be useful in the treatment of chronic low back pain if they aim at improving return to normal daily activities and work." Van Tulder found that the majority of the studies cited did not reveal any advantage or very small advantage in pain and disability with any particular type of exercise therapy over any other type or over no exercise therapy at all. Of those studies that did find an

advantage to exercise therapy, that advantage almost universally disappeared at the 1 year follow up. A couple of studies did find a significant increase in lumbar spinal strength and endurance after a course of exercise therapy but this was unrelated to any improvement in pain or disability.

Even though a few studies found an advantage to exercise therapy in earlier return to work and normal activities there was no study that showed a reduction in pain. Manniche⁵ focused on return to activity after spinal disc surgery. He found that despite a lack of improvement in pain level, exercise teaches patients that they can function better than they think they can in the presence of pain. His mantra is, "Don't let pain be your guide." Having accepted that therapeutic exercise procedures do not decrease pain, Manniche endorsed a program that put patients through ever increasing physical challenges to train them to ignore the pain. While this may look good from a return-to-work point of view it makes one wonder about the quality of life and the possible risk of future injury.

Pengel et al⁶ in a 2002 review of 43 randomized trials, found agreement with van Tulder that "exercise is no more effective for *acute* low back pain than any other active or inactive treatments." Pengel did find weak but positive evidence for exercise as an effective therapy for *sub-acute* low back pain if the definition of sub-acute was broadened to pain of six months duration.

Danielson¹⁰ looked at exercise therapy after discectomy and found no difference in clinical end points between the control and treatment groups and con-

Type of Exercise Therapy	Definition	Examples
In-house/supervised	Exercises are performed under supervision by a qualified provider	<ul style="list-style-type: none"> Flexibility training. General aerobic or fitness exercises such as walking, "spinning", elliptical training, weight training or machine based "circuit" training Strengthening exercises focused on abdominal flexion and/or back extensor muscles Isometric lumbar stabilization exercises focused on abdominal oblique and multifidus contractions
Home-based/independent	Exercises are taught to the patient with the goal of performing the exercises at home without supervision	<ul style="list-style-type: none"> Advice to "stay active" Flexibility training General aerobic or fitness exercises such as walking, "spinning", elliptical training, weight training or machine based "circuit" training Strengthening exercises focused on abdominal flexion and/or back extensor muscles Isometric lumbar stabilization exercises focused on abdominal oblique and multifidus contractions

Figure 1. Types of exercise therapy, definitions, and examples.

cluded that at least exercise didn't make patients worse.

A review of 27 trials by Silvano Mior in 2001 found,⁸ "Exercise is effective for the management of chronic low back pain for up to 1 year after treatment . . ." This report stated that the effects of exercise fade over 12 months. Although they may hasten recovery, the long term effects are no different than without treatment and that, ". . . there was strong evidence that exercise is effective in the management of chronic low back pain but that there is no evidence favoring one exercise over another." In considering this discrepancy Mior foreshadows future studies when he notes that in the majority of studies and in previous reviews there is very little evaluation of subgroups of back pain.

The majority of studies prior to the year 2000 seemed to use a broad approach to exercise. There was little effort to adapt or modify the exercise program to the individual patients. Studies looked at either flexion or extension or conditioning or balance or some combination of these applied to the whole test group without consideration for the individual characteristics of the patients involved. Detori¹¹ randomly divided military personnel with back pain into flexion or extension exercise groups without regard to the individual aspects of the patient and found no difference in clinical outcome. Erhard¹³ compared patients randomly selected to either extension exercise or manipulation treatment groups. The groups receiving manipulation had a significantly beneficial response but the exercise group showed no improvement. In the majority of studies prior to 2000, if there was any differentiation into subgroups to be tested it was based on whether the pain was acute, sub-acute or chronic.^{11,13-16} They found little reason to believe that any form of exercise was any better than any other or even in some cases, no treatment at all.

In a randomized controlled trial on acute low back pain patients in 2004, Wand et al¹⁷ concluded that for a treatment group receiving education, exercise therapy and manual therapy disability and pain were not significantly different at long-term follow up when compared to the non-treatment group.

After the failure to find clinical benefit to therapy based on chronicity of pain, discussion in the literature began to question whether categorization by how long the individual has been in pain may be

less useful than a description based on the etiology and physiological characteristics of the patient. Mior stated,⁸ "The lack of support for a specific form of exercise may be because of a failure to recognize the effects of certain exercises on the skeleton and its supporting structures."

One earlier study in 1993 by Hansen¹⁸ did take a unique approach in analyzing response to exercise therapy based on gender and whether subjects were employed in a hard physical occupation. Hansen found that people with weaker muscles responded better to exercise and those with physically hard occupations responded better to passive therapies.

Finally, in 1998, Torstensen¹⁹ designed a study that provided some differentiation based on the subjects response to specific movements. He found good clinical response in an exercise program utilizing multiple exercise protocols that remained sensitive to the subjective experience of the patient while exercising. Exercise that hurt were minimized, exercises that reduced pain were emphasized. This presages the 2004 study by Long²⁰ that divided exercise groups based on their "directional preference". The patient's directional preference being the direction -either flexion, extension or one lateral direction - that does not cause pain or relieves the pain. Long found that paying attention to the patient's individual "directional preference" leads to high patient compliance and response to exercise therapy in both acute and chronic low back patients. Previous studies that ignored directional preference or forced individuals to perform exercises despite pain had poor compliance and outcomes. When directional preference was used to determine the exercise protocol beneficial clinical response was demonstrated within 6 visits over a 2-week period. Long did not differentiate based on chronicity stating,²⁰ "There is growing opinion that the equivocal or conflicting results among exercise trials can be attributed to the faulty assumption that the "non-specific" LBP populations studied were homogeneous." Separating patients based on directional preference presumably differentiates between the actual anatomic pain generators or physiological imbalances that can be corrected with exercise.

Acute lower back pain is probably complicated by a strong component of inflammation, as reflected in the success of anti-inflammatory medications and modalities in dealing with acute back pain. Success with these acute lumbar pain patients demonstrates

that the directional preference exercises relieved strain on the acutely injured tissues. Success with chronic pain patients may reflect the correction of chronic postural stressors on the supporting tissues. Long²⁰ excluded subjects who did not exhibit a directional preference recognizing that there was a further subgroup that did not fit either flexion or extension pain patterns. This group represented about 1/4 of the initial subject volunteers. In these cases the most likely answer comes from addressing issues of micro instability within the “neutral zone” as proposed by Panjabi. Neutral zone instability would theoretically present with pain in multiple ranges of motion because of segmental ligament laxity or failure of the passive stabilization system of the spine. Exercises to address neutral zone instability would require specific training of the transverse abdominal, oblique abdominals and multifidi. This can be done with neutral posture isometric stabilization exercises such as abdominal hollowing for example. A number of studies^{21–24} exist that demonstrate the clinical effectiveness of this type of exercise for low back pain of all types including individuals with instability resulting from spondylosis and spondylolisthesis. Of particular note is that it results in sustained benefit even 3 years after intervention. These procedures can be easily taught and re-enforced in a few office visits.

In addition to specific exercise therapy, education in prevention and self-care can be a cost effective measure reducing provider dependence and improving outcomes. Two studies looked at the effectiveness of “back school” programs that teach subjects home exercises and self care techniques.^{25,26} Both studies found that the subjects had less pain and perceived disability after the program than control groups that did not have the training. A 1-year follow up of 1 of the studies found that there was still a measurable improvement 12 months after the intervention. There are no studies as yet looking at the combination of direction specific exercise training and “back school” type programs but a combination of the 2 modalities would seem to be a natural and effective approach to back pain therapy.

CONCLUSIONS

The current evidence for non-direction-specific supervised exercise therapy is not strong for chronic low back pain. Gains that are achieved in the short term fade by 12 months unless some training in home exercise is provided. Even so, several studies

suggest that any kind of physical activity such as aerobics or balance training may provide an equivalent clinical benefit to the supervised low back exercise programs commonly prescribed. More recent studies support a more targeted approach taking into consideration the directional preference of the patient and addressing muscle groups that augment stabilization of the “neutral zone”. Such approaches yield effective clinical response in acute and chronic patients as early as 2 weeks with 6 visits and provide lasting benefit up to 3 years after intervention. The combination of training in self-care techniques and specific-direction exercise routines for low back patients could be a potential resource for patients with back pain and health care systems looking to improving back pain outcomes and reduce costs related to back pain treatment. Further studies elucidating dose response for specific-direction exercises will help clarify best practice and clinical practice guideline parameters.

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