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Core Stability Exercise Versus General Exercise for Chronic Low Back Pain

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Clinical Questions: Is core stability exercise more effective than general exercise in the treatment of patients with nonspecific low back pain (LBP)?

Data Sources: The authors searched the following databases: China Biological Medicine disc, Cochrane Library, Embase, and PubMed from 1970 through 2011. The key medical subject headings searched were *chronic pain*, *exercise*, *LBP*, *lumbosacral region*, and *sciatica*.

Study Selection: Randomized controlled trials comparing core stability exercise with general exercise in the treatment of chronic LBP were investigated. Participants were male and female adults with LBP for at least 3 months that was not caused by a specific known condition. A control group receiving general exercise and an experimental group receiving core stability exercise were required for inclusion in the meta-analysis. *Core stability* was defined as the ability to ensure a stable neutral spine position, but the type of exercise was not specified. Outcome measures of pain intensity, back-specific functional status, quality of life, and work absenteeism were recorded at 3-, 6-, and 12-month intervals.

Data Extraction: The study design, participant information, description of interventions in the control and experimental groups, outcome measures, and follow-up period were extracted. The mean difference (MD) and 95% confidence interval (CI) were calculated to evaluate statistical significance. Risk of bias was assessed using the Cochrane Collaboration Recommendations, and all articles were rated as high risk for other bias with no further explanation given.

Main Results: Five studies involving 414 patients were included. Four studies assessed pain intensity using the visual analog scale or numeric rating scale. In the core stability exercise group, the reduction in pain was significant at 3 months (MD = –1.29, 95% CI = –2.47, –0.11; $P = .003$) but not at 6 months (MD = –0.50, 95% CI = –1.36, 0.35; $P = .26$). Functional status was improved at 3 months (MD = –7.14, 95% CI = –11.64, –2.65; $P = .002$) but not at 6 months (MD = –0.50, 95% CI = 0.36, 0.35; $P = .26$) or 12 months (MD = –0.32, 95% CI = –0.87, 0.23; $P = .25$). All of the included studies assessed back-specific functional status: 4 used the Oswestry Disability Index and 1 used the Roland-Morris Disability Questionnaire. Patients in the core stability exercise groups experienced improved functional status versus the general exercise group at 3 months (MD = –7.14, 95% CI = –11.64, –2.65; $P = .002$); no results were recorded at 6 or 12 months.

Conclusions: In the short term, core stability exercise was more effective than general exercise for decreasing pain and increasing back-specific functional status in patients with LBP.

Key Words: lumbopelvic, spinal stiffness, base of support

COMMENTARY

Low back pain (LBP) is one of the most frequent disabilities reported in Western countries. Therapeutic exercise is a common conservative intervention used by clinicians to decrease pain, improve disability, and restore muscular function.[1] Core stability exercises have become a popular form of therapeutic exercise and are seen as a critical component to restoring proper kinetic function.[2] However, evidence to support their use and draw definitive conclusions is lacking.[1,2] Further complicating the treatment of LBP are the lack of a universal definition of core stability and the disputed accuracy of clinical tests used to identify an unstable core.[1] In their systematic review, Wang et al[3] found that core exercises produced better outcomes than general exercise during the initial 3 months of intervention for LBP. Further research has demonstrated improvements in pain and disability ratings when patients with LBP completed either core-specific or general low back exercise protocols.[4] Yet that significance was absent when core exercise was compared with general low back exercise.[4] Other investigators[5] have suggested clinicians should focus on interventions that improve disability and have noted improvements in LBP patients who perform some kind of core exercise.

One of the long-held perceptions regarding the treatment of LBP is that the muscular boundaries of the lumbopelvic area provide a corset-like stability that leads to a stable spine.[1] This thought arose from the functional anatomy of the core musculature, such that increased intra-abdominal pressure leads to stiffness of the stabilizing muscles. The transverse abdominus and multifidus muscles serve as the primary generators of intra-abdominal pressure: electromyographic activity has been demonstrated immediately before extremity movement.[1] These findings have led many to adopt the idea that activation of these core stabilizers is a

normal precursor to dynamic contractions of the extremity musculature. Promoting this perception was the finding that patients reporting LBP displayed decreased electromyographic activity in the transverse abdominus and multifidus muscles.[1] However, the relationship between these findings is not fully understood.

Another commonly held perception about core function is that a stable base of support acts as a transfer point for powerful extremity muscles to generate forceful dynamic contractions.[1,2] Poor core stability is thought to place excess force from the extremity muscles on the spinal structures, leading to earlier fatigue and a higher risk of injury.[2,3] One of the few studies to evaluate the role of core stability in the risk of injury was performed by Zazulak et al[6] on female collegiate soccer athletes. After obtaining prospective measurements of neuromuscular control in repositioning trunk displacement, the authors tracked knee injuries over 3 years. Participants who sustained knee ligament injuries showed decreased neuromuscular control of the core musculature, and greater deficits in control correlated with a higher risk of knee injury.[3]

Ultimately, reduced pain and increased function are outcomes that most clinicians would agree justify the use of specific interventions. Even though long-term improvements in pain and functional levels were similar between the core stability and general exercise groups, incorporating these techniques into the early phases of rehabilitation may be beneficial.[3] Patients are more likely to perceive the effectiveness of core exercises than that of other pain-reduction methods.[5] Decreased pain and increased function in the early stages of intervention may help the patient associate the rehabilitative experience with improvement in the condition. This can demonstrate the value of the patient-clinician relationship and lead to increased compliance with all prescribed interventions.

Because of the inconsistent evidence regarding the role of core stability exercise in the treatment of LBP, clinicians are challenged when trying to practice evidence-based medicine. Using core plus low back exercises has resulted in more improvement than general exercise alone, but no specific protocol has been developed.[1,4,5] Evidence-based medicine requires a balance of the clinician's own knowledge and experience, the patient's values in terms of treatment outcomes, and synthesis of the current literature on the subject. In the absence of high-quality evidence, clinicians must rely on their own clinical expertise and the values of their patients when making decisions regarding the incorporation of core stability exercises in the treatment of LBP.

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