



## Stabilization exercise compared to general exercises or manual therapy for the management of low back pain: A systematic review and meta-analysis



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### ABSTRACT

**Aim:** We performed a systematic review with a meta-analysis to examine the efficacy of stabilization exercises versus general exercises or manual therapy in patients with low back pain.

**Design:** We searched MEDLINE, Cochrane Controlled Trials, Scielo, and CINAHL (from the earliest date available to November 2014) for randomized controlled trials that examined the efficacy of stabilization exercises compared to general exercises or manual therapy on pain, disability, and function in patients with low back pain. Weighted mean differences (WMD) and 95% confidence intervals were calculated.

**Results:** Eleven studies met the inclusion criteria (413 stabilization exercises patients, 297 general exercises patients, and 185 manual therapy patients). Stabilization exercises may provide greater benefit than general exercise for pain reduction and improvement in disability. Stabilization exercise improved pain with a WMD of  $-1.03$  (95% CI:  $-1.29$  to  $-0.27$ ) and improved disability with a WMD of  $-5.41$  (95% CI:  $-8.34$  to  $-2.49$ ). There were no significant differences in pain and disability scores among participants in the stabilization exercise group compared to those in the manual therapy group.

**Conclusions:** Stabilization exercises were as efficacious as manual therapy in decreasing pain and disability and should be encouraged as part of musculoskeletal rehabilitation for low back pain.

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## 1. Background

Low back pain (LBP) is a multifactorial disorder with a high prevalence; most people experience back pain at some point in their life and it has a significant impact on individuals, their families, and the healthcare systems. This disorder causes disability, participation restriction, a career burden, the use of health-care resources, and a financial burden. In addition to medical treatment, musculoskeletal physiotherapy (exercise therapy and

manual therapy) is the most common method of conservative intervention for LBP (Amit, Manish, & Taruna, 2013; Hoy, Brooks, Blyth, & Buchbinder, 2010; Smith et al., 2014).

The European Guidelines for Management of Chronic Non-Specific Low Back Pain (Airaksinen et al., 2006) recommend supervised exercise therapy as the first-line treatment. Stabilization exercise programs have become widely used for low back rehabilitation because of its effectiveness in some aspects related to pain and disability (Ferreira, Ferreira, Maher, Herbert, & Refshauge, 2006; Liddle, David Baxter, & Gracey, 2009). Stabilization exercise are exercise interventions that aim to improve function of specific trunk muscles thought to control inter-segmental movement of the spine and enable the patient to regain control and coordination of the spine and pelvis using principles of motor learning such as segmentation and simplification (Hodges and Richardson, 1996;

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Although stabilization exercises have become the major focus in spinal rehabilitation, as well as in prophylactic care, the therapeutic evidence using pain and disability control variables as outcomes remains controversial. Most therapeutic studies have compared stabilization exercise, general exercise, and manual therapy. Systematic reviews to date that have evaluated the effectiveness of exercise therapies have concluded that there is no evidence to support the superiority of one form of exercise over another (Ferreira et al., 2006; Macedo et al., 2010).

In a recent review, Wang et al. (Wang et al., 2012) showed that stability exercise is more effective for decreasing pain than general exercise, and it may improve physical function in patients with chronic LBP. However, the efficacy of stability exercise was not compared with manual therapy. After reviews on this topic were published (Ferreira et al., 2006; Macedo et al., 2010; Wang et al., 2012), new randomized controlled trials (RCTs) have been released (Amit et al., 2013; Inani and Selkar, 2013; Macedo et al., 2012; Sung, 2013). The Cochrane Collaboration recommends that systematic reviews be updated biannually (Higgins and Green, 2006). Moreover, as far as we know, no meta-analysis has been performed on studies comparing segmental stabilization exercise with manual therapy. The meta-analysis technique minimizes subjectivity by standardizing treatment effects of relevant studies into effect sizes (ESs), pooling, and analyzing data to draw conclusions.

The aim of this systematic review with meta-analysis was to analyze published RCTs that investigated the efficacy of stabilization exercises versus general exercises or manual therapy in patients with LBP.

## 2. Methods

This review was planned and performed in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher et al., 2009).

### 2.1. Eligibility criteria

This systematic review included all RCTs that investigated the efficacy of stabilization exercises in patients with non-specific LBP. Studies that compared a stabilization exercises group with a general exercises group or a stabilization exercises group with a manual therapy group were included. Studies were considered for inclusion regardless of publication status, language, or size.

Trials that enrolled patients with chronic non-specific LBP were included in this meta-analysis. For this study was considered the chronic nonspecific LBP as low back pain (>3 months' duration) without leg pain. The studies that enrolled patients with acute LBP in association with neurologic diseases were excluded from this systematic review.

The main outcomes of interest were pain (assessed using visual analog scale, numerical rating scale, or any other instrument or scale) with scores ranging from 0 to 10, disability, and function assessed by any questionnaire.

To be eligible, the RCTs should have randomized patients with chronic LBP to at least one group of stabilization exercises.

For this review, stabilization exercises was considered as prescribed exercises aimed at improving function of specific trunk muscles that control inter-segmental movement of the spine, including the transversus abdominis, multifidus, diaphragm, and pelvic floor muscles (Hodges and Richardson, 1996; Richardson et al., 1999). General exercise were prescribed exercises that included strengthening and/or stretching exercises for the main muscle groups of the body as well as exercises for cardiovascular

fitness. Manual therapy comprised physiotherapy based on manual techniques (joint mobilization or manipulation techniques).

### 2.2. Search methods for identification of studies

We searched for studies on MEDLINE, LILACS, EMBASE, SciELO, Cumulative Index to Nursing and Allied Health (CINAHL), PEDro, and the Cochrane Library, up to November 2014, without language restrictions. A standard protocol for this search was developed and whenever possible, a controlled vocabulary was used (Mesh terms for MEDLINE and Cochrane; Emtree for EMBASE). Keywords and their synonyms were used to sensitize the search.

For identification of RCTs in PUBMED, the optimally sensitive strategy developed for the Cochrane Collaboration was used (Higgins and Green, 2006). For identification of RCTs in EMBASE, a search strategy using similar terms was adopted. In the search strategy, there were four groups of keywords: study design, participants, interventions, and outcome measures.

We analyzed the reference lists of all eligible articles in order to detect other potentially eligible studies. For ongoing studies or when any data was to be confirmed or additional information was needed, the authors were contacted by e-mail.

The previously described search strategy was used to obtain titles and abstracts of studies that were relevant for this review. Each identified abstract was independently evaluated by two authors. If at least one of the authors considered one reference eligible, the full text was obtained for complete assessment. Two reviewers independently assessed the full text of selected articles to verify if they met the criteria for inclusion or exclusion. In case of any disagreement, the authors discussed the reasons for their decisions and a consensus was reached.

Two authors, independently blinded, extracted descriptive and outcome data from the included studies using a standardized form developed by the authors and adapted from the Cochrane Collaboration's (Higgins and Green, 2006) model for data extraction. We considered: 1) aspects of the study population, such as the average age and sex; 2) aspects of the intervention performed (sample size, type of stabilization exercise performed, presence of supervision, frequency, and duration of each session); 3) follow-up (if the patients included were analyzed); 4) loss to follow-up (if there was a loss in the sample); 5) outcome measures; and 6) presented results. Another author resolved disagreements. Any additional information required from the original author was requested by e-mail.

The risk of bias of included studies was assessed independently by two authors using The Cochrane Collaboration's "Risk of bias" tool (Higgins and Green, 2006). The following criteria were assessed: Random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, intention-to-treat analysis, and completeness of follow-up.

The quality of evidence was independently scored by two researchers based on the PEDro scale (Olivo et al., 2008) that consisted of 11 items based on a Delphi list (Verhagen et al., 1998). The PEDro scale is a useful tool for assessing the quality of physical therapy and rehabilitation trials (Olivo et al., 2008). One item on the PEDro scale (eligibility criteria) is related to external validity and is generally not used to calculate the method score, leaving a score range of 0–10 (Maher, Sherrington, Herbert, Moseley, & Elkins, 2003).

### 2.3. Statistical assessment

Pooled-effect estimates were obtained by comparing the least square mean percentage change from the baseline to the study end for each group, and were expressed as the weighted mean

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