SPINE Volume 34, Number 16, pp 1669–1684

Massage for Low Back Pain

An Updated Systematic Review Within the Framework of the Cochrane Back Review Group

Andrea D. Furlan, MD, PhD,*†‡ Marta Imamura, MD, PhD,§ Trish Dryden, RMT, MEd,¶ and Emma Irvin, BA*

Study Design. Systematic Review.

Objectives. To assess the effects of massage therapy for nonspecific low back pain.

Summary of Background Data. Low back pain is one of the most common and costly musculoskeletal problems in modern society. Proponents of massage therapy claim it can minimize pain and disability, and speed return to normal function.

Methods. We searched MEDLINE, EMBASE, CINAHL from their beginning to May 2008. We also searched the Cochrane Central Register of Controlled Trials (The Cochrane Library 2006, issue 3), HealthSTAR and Dissertation abstracts up to 2006. There were no language restrictions. References in the included studies and in reviews of the literature were screened. The studies had to be randomized or quasi-randomized trials investigating the use of any type of massage (using the hands or a mechanical device) as a treatment for nonspecific low back pain. Two review authors selected the studies, assessed the risk of bias using the criteria recommended by the Cochrane Back Review Group, and extracted the data using standardized forms. Both qualitative and meta-analyses were performed.

Results. Thirteen randomized trials were included. Eight had a high risk and 5 had a low risk of bias. One study was published in German and the rest in English. Massage was compared to an inert therapy (sham treatment) in 2 studies that showed that massage was superior for pain and function on both short- and long-term follow-ups. In 8 studies, massage was compared to other active treatments. They showed that massage was similar to exercises, and massage was superior to joint mobilization, relaxation therapy, physical therapy, acupuncture, and self-care education. One study showed that reflexology on the feet had no effect on pain and functioning. The beneficial effects of massage in patients with chronic low back pain lasted at least 1 year after the end of the treatment. Two studies compared 2 different techniques of massage. One concluded that acupuncture massage produces better results than classic (Swedish) massage and another concluded that Thai massage produces similar results to classic (Swedish) massage.

Conclusion. Massage might be beneficial for patients with subacute and chronic nonspecific low back pain, especially when combined with exercises and education. The evidence suggests that acupuncture massage is more effective than classic massage, but this need confirmation. More studies are needed to confirm these conclusions, to assess the impact of massage on return-to-work, and to determine cost-effectiveness of massage as an intervention for low back pain.

Key words: Cochrane Collaboration, massage, low-back pain, systematic review. **Spine 2009;34:1669–1684**

Low back pain (LBP) is a major health problem in modern society. Seventy to 85% of the population will experience LBP at some time in their lives.[1] Each year, 5% to 10% of the workforce is off work because of their LBP, the majority for less than 7 days. Almost 90% of all patients with acute LBP get better quite rapidly, regardless of therapy. The remaining 10% are at risk of developing chronic pain and disability, and account for more than 90% of social costs for back incapacity.[2]

Although LBP is a benign and self-limiting condition, many patients look for some type of therapy to relieve their symptoms and to provide them with hope for a cure. For this reason, it is possible to list more than 50 potential therapies promising to relieve the pain, lessen the suffering, and offer a cure for this problem. However, there is sound evidence for only a minority of these therapies.[3]

When experiencing pain or discomfort, the natural reaction is to rub or hold the affected area to reduce the sensation. At its most basic, massage is a simple way of easing pain, while at the same time aiding relaxation, promoting a feeling of well being, and a sense of receiving good care. Soft-tissue massage is thought to improve physiologic and clinical outcomes by offering the symptomatic relief of pain through physical and mental relaxation, and increasing the pain threshold through the release of endorphins.[4] The gate-control theory predicts that massaging a particular area stimulates large diameter nerve fibers. These fibers have an inhibitory input onto T-cells (which are the first cells that project into the central nervous system within the spinal cord). T-cell activity is depressed (whereas, conversely, small diameter nerve fibers [nociceptive fibers] have an excitatory

From the *Institute for Work & Health, Toronto, ON; †Department of Medicine, University of Toronto, Toronto, ON; ‡Toronto Rehabilitation Institute, Toronto, ON; §Division of Physical Medicine and Rehabilitation, Department of Orthopaedics and Traumatology, University of São Paulo School of Medicine, São Paulo, Brazil; and ¶Centennial College, Applied Research Centre, Toronto, ON.

The manuscript submitted does not contain information about medical device(s)/drug(s).

No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.

This review is adapted from the Cochrane Review "Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews 2008, Issue 4. Art. No: CD001929. DOI: 10.1002/14651858.CD001929." Copyright Cochrane Library, reproduced with permission.

Address correspondence and reprint requests to Andrea D. Furlan, MD, PhD, Institute for Work & Health, 481 University Avenue, Suite 800, Toronto, ON, Canada M5G 2E9; E-mail: afurlan@iwh.on.ca

input) and pain relief follows.[5] Massage therapy may provide its benefits by shifting the autonomic nervous system from a state of sympathetic response to a state of parasympathetic response. However, support for this theory is not universal, and it has even been suggested that massage therapy may promote a sympathetic response of the autonomic nervous system.[6] The mechanistic links between manipulation of body tissues and corresponding relief from a broad range of symptoms are not fully understood. Mechanistic studies are needed to delineate underlying biologic and psychological effects of massage and their relationship to outcomes.

The use of massage for LBP is very popular. In eastern cultures, massage is believed to have powerful analgesic effects, particularly if applied to acupuncture-points, a technique known as "acupressure." In 1998, Wainapel et al surveyed an urban rehabilitation medicine outpatient office in New York to address the use of alternative therapy and their perceived effectiveness.[7] The results indicated that 29% of the subjects used one or more alternative medical therapies in the past 12 months and the most common therapy cited was massage. Musculoskeletal pain syndromes involving the spine and extremities were the most commonly reported problems. Fifty-three percent of the patients who used alternative treatments reported some degree of effectiveness.

Massage is recognized as a safe therapeutic modality, with few risks or adverse effects. However, there are contraindications, such as, applying massage over an area with acute inflammation, skin infection, nonconsolidated fracture, burn area, deep vein thrombosis, or over sites of active cancer tumor.[8] Minor pain or discomfort was experienced by 13% of participants during or shortly after receiving massage.[9]

Massage has been investigated in the pain management area for its efficacy in relieving headaches,[10] postexercise muscle pain,[11] cancer pain,[12] and mechanical neck pain.[13] These studies show little or no effect of massage in relieving these pain conditions. In 2004, Moyer *et al* reported on a meta-analysis of 37 randomized trials (1802 participants) for many different health conditions. This meta-analysis supports the general conclusion that massage therapy is effective. Thirty-seven studies yielded a statistically significant overall effect as well as 6-specific effects out of 9 that were examined. Significant results were found within the single-dose and multiple-dose categories, and for both physiologic and psychological outcome variables.[6]

Our previous systematic review concluded that massage was beneficial for chronic LBP,[14–16] but it is out-of-date because of more recently published trials. Therefore, the need for an updated review on this topic.

■ Objectives

The main objective of this review was to update our previously published systematic review to assess the effectiveness of massage therapy in patients with nonspecific LBP compared to:

1. Sham or placebo massage (explanatory trials),
2. Other medical treatments (pragmatic trials),
3. No treatment.

Secondary objectives were to:

1. Compare the addition of massage to other treatments,
2. Assess the effectiveness of different techniques of massage.

■ Methods

Criteria for Considering Studies for This Review

Types of Studies. Published and unpublished reports of completed randomized controlled trials (RCTs), quasi-randomized, and controlled clinical trials with no language restrictions were included. Abstracts of ongoing studies were excluded.

Types of Participants

- Adults (older than 18 years) with acute (less than 4 weeks), subacute (4 to 12 weeks), or chronic (more than 12 weeks) nonspecific LBP.[17]
- LBP is defined as pain localized from the costal margin or 12th rib to the inferior gluteal fold.[2]
- Nonspecific indicates that no specific cause is detectable, such as infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, inflammatory process, or radicular syndrome. RCTs that included subjects with specific cause of LBP were excluded.

Types of Interventions. Massage in this review is defined as soft-tissue manipulation using hands or a mechanical device. Massage can be applied to any body part, to the lumbar region only or to the whole body. We used the taxonomy of massage treatments for musculoskeletal pain developed by Sherman *et al* to include studies in this review.[18] The taxonomy was conceptualized as a 3-level classification system: goals of treatment, styles, and techniques. Four categories described the principal goal of treatment: relaxation massage, clinical massage, movement re-education, and energy work. Each goal of treatment could be met using a number of different styles, with each style consisting of a number of specific techniques. A total of 36 distinct techniques were identified and described, many of which could be included in multiple styles (Table 1). We excluded trials in which massage was not applied with any of the goals of treatment described above.

In physiotherapy, massage is considered an adjunct therapy or a complementary treatment to prepare the patient for exercise or other interventions; it is rarely the main treatment used. However, there are practitioners (*e.g.*, massage therapists) who employ massage as the only intervention. In this review, we analyzed massage alone because it is difficult to reach definite conclusions when multiple treatments are involved.

Types of Outcome Measures. Trials were included that used at least one of the following 5 primary outcome measures:

- Pain,
- Overall improvement,
- Back-specific functional status,
- Well being (*e.g.*, quality of life),
- Disability (*e.g.*, activities of daily living, work absenteeism).

Table 1. Taxonomy of Massage Practice (Sherman *et al* 2006)

Goal of Treatment	Relaxation Massage	Clinical Massage	Movement Reeducation	Energy Work
Intention	Relax muscles, move body fluids, promote wellness	Accomplish specific goals such as releasing muscle spasms	Induce sense of freedom, ease, and lightness in body	Hypothesized to free energy blockages
Commonly used styles (examples)	Swedish massage; spa massage, sports massage	Myofascial trigger points therapy; myofascial release, strain counterstrain	Proprioceptive; neuromuscular facilitation; strain counterstrain; trager	Acupressure; reiki; polarity; therapeutic touch; tuina;
Commonly techniques (examples)	Gliding, kneading, friction, holding, percussion, vibration	Direct pressure, skin rolling, resistive stretching, stretching manual, cross-fiber friction	Contract-relax, passive stretching, resistive stretching, rocking	Direction of energy, smoothing, direct pressure, holding, rocking, traction

Physical examination measures such as range of motion, spinal flexibility, degrees of straight leg raising, or muscle strength were considered secondary outcomes. They were extracted only if no primary outcomes were available because they correlate poorly with the clinical status of the patient.[19]

The timing of the outcome measurements were divided into 2 categories: (1) short-term: when the outcome assessment was taken from the end of the intervention period up to 3 months after randomization and (2) long-term: when the outcome assessment was taken more than 3 months after randomization.

Search Methods for Identification of Studies

The following databases were searched:

- The Cochrane Central Register of Controlled Trials, in The Cochrane Library 2006, Issue 3.
- MEDLINE from 1966 to May 2008 using OVID (search strategy is given in Appendix, see Supplementary Digital Content 1, http://links.lww.com/A1455).
- HealthSTAR from 1991 to August 2006, using OVID 3.0.
- CINAHL from 1982 to May 2008 using OVID (search strategy is given in Appendix, see Supplementary Digital Content 1, http://links.lww.com/A1455).
- EMBASE from 1980 to May 2008, using OVID (search strategy is given in Appendix, see Supplementary Digital Content 1, http://links.lww.com/A1455).
- Dissertation abstracts from 1861 to May 1999, using Silver Platter (version 3.10).
- Contact with experts (May 1999): American Massage Therapy Association, Touch Research Institute, Fundacion Kovacs (Spain), National Center for Complementary & Alternative Medicine from the National Institutes of Health, National Association of Nurse Massage Therapists, Rolf Institute.
- Handsearch of reference lists in review articles, guidelines, and in the retrieved trials.
- Contact with experts in the field of spine disorders (May 1999): Editorial Board of the Cochrane Back Review Group and the Cochrane Complementary Medicine Field.

The search strategy recommended by the Cochrane Back Review Group[20] was used to find controlled trials for spinal diseases. The search strategies were reviewed and conducted by an expert librarian (E.I.) and the Cochrane Back Review Group Trials Search Coordinator (Rachel Courban) (mentioned in Appendix, see Supplementary Digital Content 1, http://links.lww.com/A1455).

Data Collection and Analysis

Selection of the Articles. One review author (E.I.) conducted the electronic searches in MEDLINE, HealthSTAR, CINAHL, and EMBASE. The results were merged using Reference Manager 9.5 and duplicates were manually removed. Two review authors (A.F. and M.I.), applied the inclusion criteria described above. One review author (A.F.) conducted the searches in The Cochrane Central Register of Controlled Trials and Dissertation Abstracts and contacted the experts in the field. For articles written in languages other than English, we sought help from the Cochrane Collaboration to translate and extract the data.

Assessing Risk of Bias. Two review authors (A.F., T.D. or M.I.) assessed the risk of bias of each article. In the case of disagreement, review authors tried to reach consensus and if necessary, a third review author helped to solve disagreements.

The risk of bias of the articles was assessed using the criteria recommended in the method guidelines for systematic reviews in the Cochrane Back Review Group,[20] which are shown in Table 2. Each criterion was scored as "yes," "no," or "don't know." The risk of bias assessment of the studies was used for 2 purposes: first, to exclude studies with fatal flaws (such as dropout rate higher than 50%, statistically significant and clinically important baseline differences that were not accounted for in the analyses). Studies that passed the first screening for fatal flaws were classified into high or low risk of bias. A study with low risk of bias was defined as a trial fulfilling 6 or more of the 11 methodologic quality criteria and not having a fatal flaw. A study with high risk of bias was defined as fulfilling fewer than 6 criteria and not having a fatal flaw. The classification into high/low risk of bias was used to grade the strength of the evidence.

Data Extraction. Two review authors (A.F., T.D. or M.I.) extracted the data from each trial, using a standardized form. The following data were extracted from each study in addition to the data for the risk of bias assessment: methods of patient recruitment, age of patients, country, number of patients included in each arm, length of LBP episode, causes of LBP, previous treatments for LBP (including surgery), types of interventions, number of sessions, types of outcomes measures, timing of outcome assessment, statistical analyses, and the author's conclusions about the effectiveness of the interventions.

Data Analysis. All quantitative results were entered into RevMan Analysis 4.2. Results for continuous variables were reported as weighted mean difference when the outcome measures were identical, and standardized mean difference (SMD) when the outcome measures were different. Statistical pooling

Table 2. Risk of Bias

	Adequate Sequence Generation?	Allocation Concealment?	Blinding? (All Outcomes Patients?	Blinding? (All Outcomes-Providers?	Blinding? (All Outcomes—Outcome Assessors?	Incomplete Outcome Data Addressed? (All Outcomes-Drop-Outs?)	Incomplete Outcome Data Addressed? (All Outcomes-ITT Analysis?)	Similarity of Baseline Characteristics	Cointerventions Avoided or Similar?	Compliance Acceptable?	Timing Outcome Assessments Similar?
Chatchawan 2005	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Cherkin 2001	Yes	Yes	No	?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Farasyn 2006	?	?	No	No	No	Yes	Yes	No	?	Yes	Yes
Field 2007	?	?	No	No	No	?	?	?	?	?	Yes
Franke 2000	Yes	Yes	No	No	No	Yes	No	No	Yes	Yes	Yes
Geisser 2005	?	?	Yes	No	Yes	Yes	No	No	?	Yes	Yes
Hernandez-Reif 2001	Yes	?	No	?	?	No	?	Yes	?	Yes	Yes
Hsieh 2004	Yes	Yes	No	No	No	Yes	Yes	No	?	Yes	Yes
Hsieh 2006	Yes	Yes	No	No	No	Yes	Yes	Yes	?	Yes	Yes
Mackawan 2007	Yes	?	No	No	Yes	Yes	Yes	?	?	Yes	Yes
Poole 2007	Yes	?	No	No	No	Yes	No	?	No	?	Yes
Preyde 2000	Yes	Yes	?	?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yip 2004	Yes	?	No	No	No	Yes	Yes	Yes	?	?	?

was considered, but because of clinical heterogeneity, was not possible for the majority of the comparisons.

A qualitative analysis was performed using the GRADE approach, which uses the following elements: study design, risk of bias, consistency of results, directness (generalizability), precision of data, and reporting bias.[21] Only the primary objective and the primary outcome measures were summarized in the GRADE tables. The overall quality of evidence for each outcome is determined by combining the assessments in all domains. The quality starts at high when RCTs with low risk of bias provide results for the outcome, and reduces by a level for each of the factors not met.

High quality evidence = there are consistent findings among at least 2 RCTs with low potential for bias that are generalizable to the population in question. There are sufficient data, with narrow CIs. There are no known or suspected reporting biases.

Moderate quality evidence = one of the factors is not met.

Low quality evidence = 2 of the factors are not met.

Very low quality evidence = 3 of the factors are not met.

No evidence = no evidence from RCTs.

■ Results

Description of Studies

In our previous review, we had identified 9 publications reporting on 8 trials. However, we decided to exclude 4 of these trials in this current update because the massage therapy was not judged to be appropriate.[22–25] For this updated review, we identified 9 additional RCTs that were published after our previous review.[26–34]

In total, we included 13 trials (1596 participants) in this updated review. Four studies were conducted in the United States (416 participants),[9,28,29,35] 2 in Taiwan (275 participants),[30,31] 2 in Thailand (247 participants),[26,32] 1 in Canada (104 participants),[36] 1 in Hong Kong (61 participants),[34] 1 in Germany (190 participants),[37] 1 in the United Kingdom (243 participants),[33] and 1 in Belgium (60 participants).[27] All trials were published in English except the trial conducted in Germany, which was published in German.

The population included in the trials was similar regarding the diagnosis, which was nonspecific LBP, but differed with respect to the type of pain, duration of pain, previous treatments, and distributions of age. One trial included participants with acute LBP,[34] 3 trials included participants with subacute and chronic LBP[30,31,36] and 5 trials were limited to participants with chronic pain.[9,26,29,35,37]

The types of massage technique, duration, and frequency of treatments varied among the studies. In 2 studies, massage was applied with a mechanical device,[27,37] whereas in the remaining studies, it was done with hands. Two studies used a specific oil.[28,34] In 2 studies, distinct techniques of massage were compared.[26,37]

With respect to the outcome measures, pain intensity was used in all of the studies. Three studies[30,35,36] also included other dimensions of pain, *i.e.*, pain characteristics/quality. Nine studies assessed function/disability.[9,26,27,29,31,33,34,36,37] Work-related outcomes were assessed in 3 studies[28,31,34] and costs were reported in only 2 studies.[9,36] The timing of outcome measures varied from immediately after the end of sessions to 52 weeks after randomization. The majority of the studies included only a short-term follow-up.

Details about each included trial are given in Table 3.

Many controlled trials were found that studied massage associated with other therapies.[38–46] Although it is very common for massage to be used as an adjunct treatment for other physical treatments, these trials were not included in this review because the effect of massage could not be extracted separately.

Risk of Bias in Included Studies

The maximum number of criteria that could be met was 11. The number of criteria met ranged from 1 to 8, with an average of 5.5. There were no fatal flaws in any of the studies. Seven studies were at a high risk of bias and 6 were at a low risk of bias according to the Cochrane Back Review Group criteria. All 13 studies were described as randomized, and the method of randomized was described in 10 studies. However, concealment of allocation was appropriate in only 4 studies and it was unclear if it was done or not in 7 studies.

Table 3. Characteristics of Included Studies

Study—Methods	Participants	Interventions	Outcomes	Results/Conclusions
Chatchawan 2005 Method of randomization: block randomization, with blocks of 2, 4, and 6. Outcome assessors were blinded to intervention. Patients recruited through public announcements by local radio and flyers. Follow-up: after the end of all sessions (3 wk). No intention-to-treat analysis. Quality score: 8/11	214 patients were recruited, 180 were randomly assigned, 177 were followed at post-treatment and 172 at 1 mo. Mean age: 36.4 yr, 63% female. Work status: heavy work: N = 9 (5%); lighter work: N = 171 (95%) Pain duration: 35.7 mo No previous surgery. Diagnoses: back pain and presence of at least 1 trigger point diagnosed as the presence of local tenderness at a palpable nodule in a taut band and with pain recognition.	Massage technique: traditional Thai massage (TTM) along 2 lines on each side of the back, employing the body weight of the massage therapist to apply gentle, gradually increasing, pressure through the therapist's thumb finger, palm, and elbow, until the patient starts to feel some pain after which the pressure is maintained for 5 to 10 sec at a time, for 30 min, 10 min passive stretching during for 6 sessions over a period of 3–4 wk Experience of therapist: 4, 8, and 20 yr of experience Group 1: Traditional Thai Massage - TTM (90 randomized to this group) Group 2: Swedish massage - SM (90 randomized to this group)	Measured at baseline, immediately after first treatment; during intervention period (3 wk) and 1 mo after last treatment. (*a*) Pain: VAS (*b*) Overall improvement: not measured (*c*) Function: Thai version of the Oswestry disability questionnaire (ODQ); (*d*) Patient satisfaction: 4 point scale (1 = completely dissatisfied to 4 = very satisfied); % of very satisfied (*e*) Pressure pain threshold (PPT) algometry; Thoracolumbar ROM, body flexibility (sit-and-reach box) (*f*) Adverse events: soreness, allergic reaction (rashes and pimples) to the massage oil (*g*) Costs: not reported (*h*) Work-related: not measured	(*a*) VAS: Group 1: from 5.5 to 4.1 to 2.2 to 2.4 Group 2: from 5.2 to 3.4 to 2.0 to 2.5 (*b*) Function: ODQ (baseline, 3 wk and 1 mo FU): Group 1: from 20.7 to 13.8 to 13.4 Group 2: from 20.7 to 15.4 to 13.9 PPT: Group 1: from 2.7 to 3.0 to 3.5 to 4.2 Group 2: from 2.6 to 2.8 to 3.4 to 3.6 (*d*) patient satisfaction: Group 1: 83% d 1; 88% wk 3 Group 2: 86% d 1; 82% wk 3 Author's conclusions: "TTM or SM treatment can be used, with equal expected effectiveness, in the treatment of back pain associated with myofascial trigger points. We therefore recommend that TTM and SM be more widely promoted as alternative primary health care treatments for this disorder." Review author's comments: Comparison between 2 massage techniques (no inactive control group); patients could be blinded to which technique they were receiving;
Cherkin 2001 Method of randomization: computer-generated random sequence. Outcome assessors were blinded. Patients were HMO enrollees, 6 wk after a primary care visit for back pain. Period of study: May–October 1997 Intention-to-treat analysis Follow-up: 4, 10, and 52 wk after randomization. 95% were followed up to 52 wk. Quality score: 8/11	3996 letters were mailed. 693 consent forms returned. The first 262 enrollees confirmed eligible were randomized. Settings: This study was conducted at Group Health Cooperative, a large staff-model health maintenance organization (HMO) in Washington State, USA. Average age: 44.9 yr. 58% women. 84% white. 84% employed or self-employed. Previous treatments: 6% operation, 3% acupuncture, 16% massage. Length of pain: at least 6 wk, 61% lasted more than 1 yr.	(1) Licensed therapist. At least 3 yr of experience. Manipulation of soft tissue (*i.e.*, muscle and fascia). Swedish (71%), movement reeducation (70%), deep-tissue (65%), neuromuscular (45%), and trigger and pressure point (48%), Moist heat or cold (51%). Prohibited: energy techniques (Reiki, therapeutic touch). Proscribed meridian therapies (acupressure and shiatsu) and approaches deemed too specialized (craniosacral and Rolfing) Massage therapists recommended exercise, typically stretching. 59% also used "body awareness" techniques to help clients become more aware of their physical and kinesthetic sensations, including potential early warning signals of injury. Mean (SD) no. of visits = 8.0 (2.4). (2) Traditional Chinese medical acupuncture. Mean (SD) no. visits = 8.3 (2.3). (3) Self-care education: high-quality and inexpensive educational material designed for persons with chronic back pain: a book and 2 professionally produced videotapes.	Measured before, after 4, 10, and 52 wk of the randomization. Primary outcome measures: (*a*) Bothersomeness of back pain (0–10); bothersomeness of leg pain (0–10), or bothersomeness of numbness or tingling (0–10). The higher (of the 3) score was used. (valid) (*b*) Modified Roland Disability Scale (reliable, valid and sensitive) Secondary outcome measures: (*c*) Disability: National Health Interview Survey (*d*) Utilization: provider visits, RXs, operations, hospitalizations, medication use, visits to other massage or acupuncture practitioners (*e*) Costs (*f*) Satisfaction (*g*) SF-12, Mental Health summary scales (*h*) No. days of exercise (*f*) Work-related outcomes: not measured	Authors' conclusions: therapeutic massage was effective for persistent low-back pain, apparently providing long-lasting benefits.
Farasyn 2006 Method of randomization: block randomization, patients were randomly allocated, but method not reported Outcome assessor for PPT measurement was blinded to intervention Follow-up: 1 wk after session Intention-to-treat analysis: yes. Quality score: 4/11	170 patients were recruited, 60 were randomized and 60 were followed. Mean age: 43 in placebo group, 41 in treatment group and 40 in control group 55% males in placebo group, 65% males in treatment group and 56% males in control group % White: not reported Work status: not reported Pain duration: >3 wk and <12 wk Previous surgery: not reported Diagnoses: nonspecific low-back pain	Massage technique: Roptrotherapy: 30-min deep cross-friction massage with the aid of a myofascial T-bar made of bronze to contribute to the compression force by their weight (0.8 kg), within the threshold of pain that was tolerable, applying a compressive force of 5–10 kg/cm^2. One session. Experience of therapist: not reported Endermology (placebo): 30-min session using a device with a suction head adjusted to a minimal but continuous section power and applied across the middle and lower back (T6–L3) and buttocks. Groups: 1. Roptrotherapy (N = 20) 2. Placebo (endermology) (N = 20) 3. Control: No intervention (wait-list) (N = 20)	When measured: 1 wk after session (*a*) Pain: pressure pain threshold Pain VAS in mm (before and 1 wk after the treatment) (*b*) Function: Oswestry Disability Index (*c*) Overall improvement: no(*d*) Patient satisfaction: no (*f*) Adverse events: not reported (*g*) Costs: not reported (*h*) Work-related: no	Results (*a*) Pain (VAS) Group 1: from 56 to 37 Group 2: from 57 to 59 Group 3: from 49 to 52 (*b*) Function (Oswestry) Group 1: from 34 to 16 Group 2: from 36 to 38 Group 3: from 29 to 31 Author's conclusions: "The results of this study provide direct evidence that 1 deep cross-friction massage with the aid of copper myofascial T-bar applied to the lumbo pelvic region, can reduce effectively local pressure pain sensitivity, pain rating and disability in patients with subacute non-specific LBP." Review author's comments: Lack of blinding, poor description of methods of randomization.

(*Continued*)

Table 3. Continued

Study—Methods	Participants	Interventions	Outcomes	Results/Conclusions
Field 2007 Method of randomization: not described Methods of recruitment: not described Blinding: not blinded. Follow-up: immediately after the first session and after the last 10th session. Intention to treat? Quality score: 1/11	Recruited: not described Randomized: 30 Followed: not described Average age: 41 yr 16 male, 14 female 67% White, 9% hispanic, 16% African American, 8% Asian Work status: not reported Pain duration: at least 6 mo Previous surgery: not reported Diagnoses: chronic low-back pain comorbidity: not reported	Massage to the entire back, legs and knees, using a Biotone oil, two 30 min sessions per wk for 5 wk (total 10 sessions). Experience of therapist: trained therapist, time not reported Groups: (1) Massage applied to the entire back: (1) moving the flats of the hands across the back; (2) kneading and pressing the muscles; and (3) short back and forth rubbing movements on the muscles next to the spine and the muscles that attach to the hip bone. The following techniques were administered to the legs: (1) long gliding strokes toward the torso, to the entire leg; (2) kneading and moving the skin in the thigh area; (3) pressing and releasing, and back and forth rubbing movements on the area between the hip and the knee on the back of the thigh; and (4) short rubbing movements to the small muscles around the knees. In the supine position with a bolster under the knee, the participants received: (1) long gliding strokes and kneading of the neck muscles; (2) moving the flats of the hands across the abdomen; (3) pinching and moving the skin on the abdomen in all directions; and (4) kneading with mixed wringing the muscles that bend the trunk forward (rectus and oblique muscles). Then, to the entire leg: (1) stroking; (2) kneading followed by pressing and releasing the anterior thigh region; (3) flexing of the thigh and knee; and (4) pulling of both legs at the same time using direct longitudinal traction. (no. of people randomized was not described) (2) Relaxation therapy (no. of people randomized was not described): progressive muscle relaxation exercises including tensing and relaxing large muscle groups starting with the feet and progressing to the calves, thighs, hands, arms, back and face. The participants were asked to conduct these 30-min sessions at home twice a wk for 5 wk and to keep a log on the times they spent in relaxation therapy.	When measured: pre and post last day (immediately after the end of the 10 sessions) (*a*) Pain: VAS (*b*) Function: ROM (*c*) Depression: POMS-D (*d*) Stress: State Anxiety Inventory (*e*) Sleep scale: VAS (*f*) Adverse events: not reported (*g*) Costs: not reported (*h*) work-related: level of job productivity 0–5	Results: Pain Group 1: from 5.1 (2.9) to 1.4 (1.6) post last day Group 2: from 4.4 (2.1) to 2.7 (2.4) post last day Conclusion: These data, nonetheless, suggest that massage effectively reduces pain, sleep disturbances and the anxiety and depressed mood states associated with lower back pain
Franke 2000 Method of randomization: random numbers table, closed envelopes. Design: 2 × 2 factorial design. Methods of recruitment: not mentioned. Study conducted in Bad Andersheim City, Park Rehabilitation Clinic, Germany Period of study: 14 mo, until the end of 1997. No intention-to-treat analysis. All medications needed to be discontinued before the beginning of the study protocol. Follow-up: until end of sessions. Drop-outs: 11 patients (5.8%). Quality score: 5/11	190 patients were randomly assigned. Duration of pain: more than 1 yr. Participants needed to speak German to be included. Age: 25–55 yr (45 ± 8.1), 61% male. Previous treatments: analgesics, anti-inflammatory drugs, muscle relaxants, antidepressants. Majority of diagnoses included: lumbar disc prolapse without myelopathy, 28% low-back pain and 23% ischialgia.	(1) Acupuncture massage according to Penzel: Uses a manual metal roller for meridians treatment. Treats 1 unique point with a special vibrating instrument that stimulates the acupuncture point superficially (not needle insertion) (2) Teil massage (classic massage). The objective is to tonify and defonify muscle structures by increasing circulation in the skin and muscle, decrease adhesions. (3) Individual Exercises: (1) Gymnastics with music (2) Swimming (3) Ergometric training (4) Specific low-back exercises (not specified which) (5) Brügger treatment for musculoskeletal functional diseases (not specified) (6) Posture correction (7) Muscle strengthening (8) Increase resistance (9) Increase in coordination and rhythm (10) Increase in mobility and flexibility. (4) Group exercises same as individual exercises, but in group mode. Study groups: (1) + (3) (1) + (4) (2) + (3) (2) + (4)	Measured before and after the sessions. (*a*) Pain: VAS (1 to 10 cm) (*b*) Overall improvement: not measured (*c*) Function: Hanover Function Score Questionnaire for low-back pain (FFbH-R) 0–100%. (*d*) Physical examination: lumbar flexion and extension (degrees) (*e*) adverse events: not reported (*f*) Costs: not reported (*g*) Work-related outcomes: not measured	Authors' conclusions: the observed effect sizes with acupuncture massage are promising and warrant further investigation in replication studies. Acupuncture massage showed beneficial effects for both disability and pain compared with Swedish massage. Marked improvement observed in Acupuncture massage + group exercise. Acupuncture massage improved function (with individual or group exercises). Classic massage did not change function. Most decrease in pain occurred in the acupuncture massage + individual exercise group. Acupuncture massage (with individual or group exercise) reduced pain. Mean difference between acupuncture and classic massage groups: 7.0% (function) and 0.8 cm (VAS). ANOVAS: Acupuncture massage is more effective than Swedish massage for function (P = 0.008) and for pain (P = 0.038) Both exercises groups (individual or in group) are not statistically significantly different for function (P = 0.55) or for pain (P = 0.55).

(*Continued*)

Table 3. Continued

Study—Methods	Participants	Interventions	Outcomes	Results/Conclusions
Geisser 2005 Method of randomization: not described. Outcome assessor blinded to intervention. Patients were recruited from the University of Michigan Spine Program Follow-up at last visit (5th session): Included in the analysis only the 72 patients who completed the study (no intention-to-treat analysis) Quality score: 5/11	100 patients were recruited, 100 were randomized and 72 patients were followed. Mean age: 40.7 yr, 41% female, 85% white 34% not working due to pain. Mean duration of pain: 76.9 mo 18% had previous surgery Diagnoses: not reported	Massage: muscle energy technique (MET) weekly for 5 wk Experience of therapists: physical therapist with 12 yr postgraduate training in manual medicine Group 1. massage + specific exercises (N = 26) Group 2: massage + nonspecific exercises (N = 24) Group 3: sham massage + specific exercises (N = 25) Group 4: sham massage + nonspecific exercises (N = 25)	Measures taken at baseline, then at the end of the 5th session (last visit) (*a*) Pain: a1) pain rating scales (from McGill Questionnaire) and a2) VAS (*b*) Function: b1) Quebec Back Pain Disability Scale and b2) Interference subscale of the Multidimensional Pain Inventory (MPI) (*c*) Overall improvement: not measured (*d*) Patient satisfaction: 4 questions with 7-point Likert scale (*f*) Adverse events: not measured (*g*) Costs: not reported (*h*) Work-related: not measured	(*a*) Pain (VAS) Group 1: from 4.45 to 2.40 Group 2: from 3.91 to 3.39 Group 3: from 3.84 to 3.46 Group 4: from 5.20 to 4.29 (b) Function (Quebec) Group 1: from 36.05 to 31.05 Group 2: from 38.47 to 31.80 Group 3: from 34.25 to 33.28 Group 4: from 51.08 to 42.50 (*d*) Satisfaction with overall therapy: Group 1: 6.3 Group 2: 6.0 Group 3: 5.1 Group 4: 5.9 Author's conclusions: "massage therapy with specific adjuvant exercise appears to be beneficial in treating chronic low-back pain. Despite changes in pain, perceived function did not improve" Review author's comments: patients not described in details, 28% drop outs, small improvement (clinically relevant?), no big difference among groups (does it justify the costs?)
Hernandez-Reif 2001 Method of randomization: not described. 24 were randomized. Blindness not described. Recruitment of patients: self-referred. Study conducted in the USA. Period of study: not described. Follow-up: post sessions and last day of sessions. No intention-to-treat analysis. No drop-outs. Quality score: 4/11	Settings: not described Average age: 39.6 yr; 54.1% women; 67% whites; 8% hispanic; 17% African American; and 8% Asian. Duration of pain: at least 6 mo. Previous treatments: not described	(1) 30-min massage therapy sessions per wk over 5 wk by trained massage therapist. Each session started with the participant in the prone position resting the ankles on a small cushion. The massage consisted of the following techniques applied to the entire back at a level tolerant to the subject: (1) moving the flat of the hands across the back, (2) kneading and pressing of muscles and (3) short back and forth rubbing movements to the muscles next to the spine and later to the hip bones. The following techniques were administered to the legs: (1) long gliding strokes to the entire leg, (2) kneading and moving the skin in the thigh area, (3) pressing and releasing, and back and forth rubbing movements to the area between the hip and the knee, and (4) short rubbing movements to the small muscles around the knees. In the supine position with a bolster under the knee, subjects received: (1) long gliding strokes and kneading of the neck muscles, (2) moving the flats of the hands across the abdomen, (3) pinching and moving the skin on the abdomen in all directions and 4) kneading the muscles that bend the trunk forward. Then, to the entire leg: (1) stroking, (2) kneading followed by pressing and releasing the anterior thigh region, (3) slow flexing of the thigh and knee, and (4) slow pulling of both legs. (2) Relaxation therapy: (to control for potential placebo effects and the effects of increased attention given to the massage subjects): The relaxation group was instructed on progressive muscle relaxation exercises tensing and relaxing large muscle groups starting with the feet and progressing to the calves, thighs, hands, arms, back and face. The subjects were asked to conduct these 30-min session at home twice a wk for 5 wk and to keep a log.	Measured before and after each session. Pain measures: (*a*) Short-form McGill Pain Questionnaire (SF-MPQ): 11 questions based on sensory dimensions and 4 questions based on affective dimensions. (*b*) VITAS: present pain with a VAS ranging from 0 to 10. (*c*) Stress measures: Profile of Mood States Depression Scales (POMS-D): 5-point scale ranging from "not at all" to "extremely." Adequate concurrent validity and good internal consistency. Adequate measure of intervention effects. (*d*) State Anxiety Inventory (STAI): 20 items scale. The STAI scores increase in response to stress and decrease under relaxing conditions. Adequate concurrent validity and internal consistency. (*e*) Range of Motion (ROM): trunk flexion = C7-L1 (*f*) Pain flexion ROM measure (touch toes with pain). (*g*) adverse events: not reported (*h*) Costs: not reported (*i*) Work-related outcomes: not measured	Authors' conclusions: massage therapy is effective in reducing pain, stress hormones and symptoms associated with chronic low-back pain.
Hsieh 2004 Method of randomization: random table Blinding: outcome assessor, however pain is subjective and patient was not blinded	250 patients were recruited, 146 were randomized, 146 were evaluated post-treatment and 121 at 6 mo. Mean age: acupressure group: 47.6; physical therapy (control) group: 47.6	Massage technique: 6 acupressure sessions over a 4-wk period, lasting approximately 15 min (no more details were reported) Experience of therapist: performed by a designed senior therapist to render uniform technique and to ensure consistent experience to all patients.	Measured at baseline, then immediately after 6 sessions of treatment, and at the 6-mo follow-up (*a*) Pain: –Pain visual scale (0–5),	(*a*) pain score (range 0 to 45, where zero is no pain): Group 1: from 9.29 to 2.28 to 1.08 Group 2: from 7.68 to 5.13 to 3.15 (*a*) SF-PQ: pain descriptors: significant difference between groups

(*Continued*)

Table 3. Continued

Study—Methods	Participants	Interventions	Outcomes	Results/Conclusions
Follow-up: post-treatment and 6 mo Intention-to-treat analysis immediately after treatment, but not at 6-mo follow-up Quality score: 5 or 6/11	Gender: acupressure group: 30 male, 39 female; physical therapy (control) group: 40 male, 37 female Ethnicity: not reported (possible that all were Chinese patients) Work status: (n) acupressure *vs.* PT Labor 15 *vs.* 10 Office 21 *vs.* 31 Householder 21 *vs.* 19 Other 12 *vs.* 17 Pain duration: 67% of patients over 6 mo (range: 1 mo to over 10 yr) Previous surgery: not reported Diagnoses: not detailed	Groups: Group 1: acupressure (N = 69) Group 2: conventional physical therapy (N = 77) included thermotherapy, infrared light therapy, electrical stimulation, exercise therapy and pelvic manual traction. (no more details were reported)	–Pain score based on the validated Chinese version of Short-Form Pain Questionnaires (SF-PQ), 15-item: each descriptor was ranked on a intensity from 0 (none) to 3 (severe). Summation of these 15 intensity scale numbers yielded a pain score for each patient (range 0–45) (*b*) Function: not measured (*c*) Overall improvement: not measured (*d*) Patient satisfaction: not measured (*f*) Adverse events: no adverse direct of side effects were reported in the acupressure group (*g*) Costs: not reported (*h*) Work-related outcomes: not reported	Post-treatment: throbbing, shooting, stabbing, sharp, cramping, aching, sickening, punishing-cruel; at 6 mo FU: cramping, aching, tiring-exhausting Author's conclusions: "Our results suggest that acupressure is another effective alternative medicine in reducing low-back pain, although the standard operating procedures involved with acupressure treatment should be carefully assessed in the future." Review author's comments: co-interventions during treatment and FU not reported; patients and care providers not blinded to interventions; interventions and clinical settings not well described; clinically effective benefits not defined; no functional or disability outcome measures, results of pain visual scale not reported.
Hsieh 2006 Method of randomization: predetermined random table. Blinding: Outcome assessor Intention-to-treat analysis: yes, for participants lost to follow-up, baseline values were assumed at post-treatment and 6 mo follow-up. All 129 randomized patients were analyzed. Quality score: 7/11	188 patients were recruited, 129 were randomized, 129 were followed at 1 mo, and 109 at 6 mo Mean age: 50.2 in the acupressure group; 52.6 in the physical therapy group Gender: 41% female Ethnicity: not reported, (assume all Chinese) Work status: N (%) acupressure *vs.* PT Household keeper 18 (28) *vs.* 16 (25) Office worker 17 (27) *vs.* 8 (12) Heaver labor 9 (14) *vs.* 8 (12) Other 20 (31) *vs.* 33 (51) Pain duration: median (range) time since onset of pain (yr): acupressure group: 3.3 (0.2–33.3) *vs.* physical therapy group: 1.6 (0.2–34.3) Median (range) length of latest pain period (mo): acupressure group: 14.5 (0.02–360) *vs.* physical therapy group: 12 (0.25–432) Previous surgery: none (inclusion criteria) Diagnoses: chronic low-back pain over 4 mo by orthopedic surgeon	Massage technique: acupressure 6 sessions within a month Experience of therapist: 1 senior acupressure therapist delivered each session to ensure a consistent experience. No detail on time of experience Group 1: acupressure (N = 64) Group 2: conventional physical therapy received in routine physical therapy offered by the orthopaedic specialist clinic, including pelvic manual traction, spinal manipulation, thermotherapy, infrared light therapy, electrical stimulation and exercise therapy, as decided by the physical therapist (N = 65)	Measured at baseline, after 6 sessions of treatment and at 6 mo FU (*a*) Pain: VAS (01–100) (*b*) Function: 1. Roland and Morris disability questionnaire (primary outcome) (range: 0 - 24); 2. modified Oswestry disability questionnaire (*c*) Overall improvement: Chinese version of the standard core outcome measures (degree of how bothersome) (*d*) Patient satisfaction: as part of the core outcome measures: satisfaction of life with symptoms; satisfaction with previous treatment (*f*) Adverse events: not reported (*g*) Costs: not reported (*h*) Work-related: as part of the core outcome measures: pain interferes with normal work, days cut down on doing things, days off from work/school	(*a*) Pain (100-mm VAS) Group 1: from 58.8 to 30.6 to 16.1 Group 2: from 57.0 to 48.0 to 41.4 b1) Function (Roland and Morris) Group 1: from 10.9 to 5.4 to 2.2 Group 2: from 10.0 to 9.2 to 6.7 b2) Function (Oswestry) Group 1: from 24.4 to 17.0 to 12.2 Group 2: from 21.1 to 20.6 to 17.9 (*d*) satisfaction of life with symptoms: Group 1: from 1.39 to 2.38 to 3.63 Group 2: from 1.57 to 1.97 to 2.95 (*h*) days off work: Group 1: from 4.2 to 1.5 to 0.6 Group 2: from 3.3 to 3.5 to 2.5 Author's conclusions: "This study shows that acupressure is more efficacious in alleviating low-back pain than is physical therapy, as measured by pain visual analogue scale, core outcome measures, Roland and Morris disability questionnaire and Oswestry disability questionnaire." Review author's comments: acupressure intervention and clinical setting not described in detail; patients not blinded to intervention and outcome evaluations; care providers not blinded, adjuvant therapy not described; clinically important change not defined. 20 (15.5%) patients lost to FU at 6 mo.
Mackawan 2007 Method of randomization: pre generated random assignment using block randomization with sizes of 2, 4 and 6. Outcome assessor blinded to intervention. Recruitment of patients through public announcements by local radio and flyers for 9-mo period. Follow-up: immediately after the session.	Patients recruited: not reported, randomized: 67; followed: 67 Mean age: TTM: 38.97 (SD = 7.85) Mob: 38.57 (SD = 7.66) % female: 61.19% % White: not reported Work status Government service: TTM: 18 Mob: 15 Private officer: TTM: 11 Mob: 11 Student: TTM: 1 Mob: 3 Business owner:	Massage technique: Traditional Thai Massage (TTM): deep massage with prolonged pressure (5–10sec per point) on low-back muscles between L2 and L5 using the theory of "10 Sens" Experience of therapist: experienced physiotherapist (time not specified) 1 session of 10 min duration Groups: 1. TTM (N = 35) 2. Joint mobilization (N = 32): at spinous process of L2–L5 by experienced physiotherapist's thumbs over the spinous processes. 1 session of 10 min duration	Measured: immediately after (*a*) Pain: VAS (before and 5 mins after the treatment) (*b*) Function: no (*c*) Overall improvement: no (*d*) Patient satisfaction: no (*f*) Adverse events: not reported (*g*) Costs: not reported (*h*) Work-related: no (i) Saliva substance P level (before and 5 min after the treatment)	Results: (*a*) Pain (VAS) Group 1: from 4.22 to 2.45 Group 2: from 4.35 to 3.39 Author's conclusions: "Based on the results of this study, we conclude that both TTM and joint mobilization can temporarily relieve pain in patients with non-specific low-back pain. However, TTM yields slightly more beneficial effects than joint mobilization" Review author's comments: Poor description of the population, demographics, co-medications, previous use of TTM or mobilization, prior beliefs, co-morbidity, duration of pain episode, previous treatments.

(*Continued*)

Table 3. Continued

Study—Methods	Participants	Interventions	Outcomes	Results/Conclusions
Intention-to-treat analysis: yes Quality score: 7/11	TTM: 5 Mob: 3 Pain duration: >12 wk Previous surgery: excluded from study Diagnoses: nonspecific low-back pain			
Poole 2007 Method of randomization: minimization technique. Outcome assessor not blinded. Patients were recruited from primary care sources. Follow-up: at end of 6 sessions and at 6 mo. No intention-to-treat analysis. Quality score: 3/11	Recruited: 650 letters sent by 12 GPs—278 replies Randomized: 243 Follow-up:191 at baseline (78%); 165 at end of 6 sessions (68%); 156 at 6 mo (64% of 243). Reflexology: mean 47.2 (SD: 10.5) Relaxation: mean 45.6 (SD: 12.0) Non intervention: mean 47.45 (SD: 10.2) Gender: female/male Reflexology: 48/29 Relaxation: 53/29 Non intervention: 38/37 Working status: Reflexology: >50% Relaxation: >50% Non intervention: >50% Duration of pain (mo): Reflexology: 120.6 Relaxation: 128 No intervention: 114.7 Co-morbidity: not described	Massage technique: foot reflexology - Morrell technique (application of firm but gentle compression to the feet) No standardized protocol provided 6 sessions of approximately 1 hour duration over a period of 6 to 8 wk. Experienced therapist: trained to diploma level, professional indemnity insurance and extensive experience Adjuvant therapy: usual care Groups: (1) Reflexology (N = 77) (2) Relaxation (N = 82): progressive muscle relaxation (3) Usual care (N = 75)	Measured at: baseline, after the end of all sessions, at 6 mo after the end of sessions (*a*) Pain VAS (*b*) Oswestry (primary) (*c*) Beck Depression Inventory (*d*) SF-36 (primary) (*e*) Adverse events: not reported (*f*) Costs: not reported (*g*) Work related: not reported	Results: SF-36 Pain - Mean (SD): Group 1: from 38.4 (22.9) to 50.0 (25.7) to 50.7 (27.1) Group 2: from 43.8 (23.3) to 47.2 (26.3) to 48.8 (25.9) Group 3: from 37.5 (20.3) to 41.8 (25.6) to 44.4 (28.5) VAS Group 1: from 44.5 (24.8) to 35.0 (25.9) to 39.8 (29.2) Group 2: from 40.7 (28.6) to 37.9 (27.0) to 41.3(28.5) Group 3: from 40.6 (26.7) to 48.9 (29.3) to 42.7 (28.4) Author's conclusions: "The current study does not indicate that adding reflexology to usual care for the management of CLBP is any effective than usual care alone."
Preyde 2000 Method of randomization: random numbers table. Outcome assessor of range of motion was blinded. Patients were recruited by university e-mails, flyers sent to family physicians and advertisements in the local newspapers in Ontario. Period of study: 1998–1999. Follow-up: 1 mo after end of treatment. Intention-to-treat analysis. Quality score: 8/11	165 patients were recruited, 107 met the inclusion criteria and 104 were randomized. 92% were followed. Settings: This study was conducted at the Health and Performance Centre, University of Guelph, Guelph, ON, Canada, which offers multidisciplinary services such as sports medicine, physiotherapy and chiropractic manipulation. Average age: 46 yr. 51% female. Average duration of pain: 3 mo (1 wk to 8 mo). Previous treatments not described.	(1) Comprehensive Massage Therapy (CMT): various soft-tissue manipulation techniques such as friction, trigger points and neuromuscular therapy to promote circulation and relaxation of spasm or tension. Duration = 30 to 35 min. Stretching exercises for the trunk, hips and thighs, including flexion and modified extension. Stretches were to be within a pain-free range, held on 1 occasion per day for the related areas and more frequently for the affected areas. 15 to 20 min of education on posture and body mechanics, particularly as they related to work and daily activities. (2) Soft-tissue manipulation only (STM). This group received the same soft-tissue manipulation as the subjects in the CMT group. (3) Remedial exercise only (RE). This group received the same exercise and education sessions as subjects in the CMT group. (4) The control group received 20 min of sham low-level laser (infrared) therapy (SLL). The laser was set up to look as if it was functioning but was not. The subject was "treated" lying on his or her side with proper support to permit relaxation. The instrument was held on the area of complaint by the treatment provider.	Measured at baseline, at the end of the treatment and at 1-mo follow-up (*a*) Present Pain Index: PPI score (valid, reliable) (*b*) Pain Rating Index: PRI score (valid, reliable) (*c*) Roland Disability Questionnaire: RDQ score (valid, reliable, sensible) (*d*) State Anxiety Index Score (reliable, valid, internal consistent) (*e*) Modified Schoeber test (*f*) Adverse events: not reported (*g*) Costs (*h*) Work-related outcomes: not measured	Authors' conclusions: massage is beneficial for patients with subacute low-back pain. Measured at the end of all sessions and 1 mo after the end of sessions.
Yip 2004 Method of randomization: random numbers table. Blinding: not blinded. Follow-up: 1 wk after the end of treatment No intention-to-treat analysis. Quality score: 5/11	61 patients were recruited via notices on bulletin boards, 61 were randomized and 51 were followed (84%) Mean age: 45.81 yr, 97% female Ethnicity: not reported, but assume all Chinese Work status: not reported Pain duration: of current episode: Group 1: 39.16 h Group 2: 51.45 h Previous surgery: not reported	Massage technique: Acupressure consisting of the application of a light to medium finger press with 3% lavender oil with grape seed oil as the massage lubricant on 8 (4 bilateral) fixed acupoints for 2 mins each: San-Jiao-Shu (UB22), Shen-Shu (UB23), Da-Chang-Shu (UB25) and Wei-Zhong (UB40); for 35–40 min, 8 times over a 3-wk period. Before massage: 10 min "relaxation" with a digital Electronic Muscle Stimulator (7.69 Hz at 0.05 mA) delivered by 5 pairs of medium sized (2.5 cm) electrode pads on 5 bilateral acupoints [Shou-San-Li (LI10), Qu-Chi (LI11), Nao-Shu (SI10), Tian-Liao (TW15), and Tian-Zhu (BL10).	Measured at baseline and 1 wk after the end of treatment (*a*) Pain: VAS (primary outcome) (*b*) Function: ROM of lateral spine flexion (lateral fingertip-to-ground distance in cm), walking time for 15m (50ft); interference in daily activities (modified Aberdeen LBP scale-effect of LBP on sleeping, walking distance, housework/work and leisure-time activities). Higher scores mean greater interference	(*a*) Pain (VAS) Group 1: from 6.38 to 3.95 Group 2: from 5.70 to 5.62 Mean ratio change: Group 1: 39% reduction in VAS Group 2: unchanged pain intensity (*b*) Function: ROM ($P = 0.01$) Group 1: 4% improvement Group 2: 1% decline Walking time ($P = 0.05$): Group 1: 9% improvement Group 2: 3% decline Insignificant interference with daily activities

(*Continued*)

Table 3. Continued

Study—Methods	Participants	Interventions	Outcomes	Results/Conclusions
	Diagnoses: nonspecific subacute LBP defined as pain on most days in the past 4 wk, in the area between the lower coastal margins and the gluteal folds without known specific cause, such as a spinal deformity.	Experience of therapist: Nurse trained in Chinese Medicinal Nursing. The precision of the acupressure was confirmed by deqi Group 1: acupressure massage (N = 32) Group 2: usual care only (not described in detail) (N = 29)	(*c*) Overall improvement: not measured (*d*) Patient satisfaction: not measured (*f*) Adverse events: No adverse effects were reported (*g*) Costs: not reported (*h*) Work-related: part of Aberdeen scale	Author's conclusions: "Our results show that 8-sessions of acupoint stimulation followed by acupressure with aromatic lavender oil were an effective method for short-term LBP relief. No adverse effects were reported. To complement mainstream medical treatment for subacute LBP, the combined therapy of acupoint stimulation followed by acupressure with aromatic lavender oil may be one of the choices as an add-on therapy for short-term reduction of LBP." Review author's comments: no report on allocation concealment; patients and care providers not blinded to intervention and assessment; co-interventions not described; 16% lost to FU.

Only 1 study attempted to blind the patients to the assigned intervention. In this study, the patients were randomized to 4 groups and they assessed the success of patient's blinding by asking the question: "I believe I received an actual treatment from the therapist" (1 completely disagrees and 7 completely agree). There was no significant different between the groups. Four studies attempted to blind the outcome assessors.[9,29,32,36] However, when the outcome is a subjective measure such as pain, and the patient is not blinded to the intervention, the attempt of blinding of outcome assessor is irrelevant.

Effects of Interventions

The studies compared massage therapy to various control treatments as follows: 2 studies employed an inert (placebo or sham) control group[27,36]; 8 studies compared massage to various active treatments[9,28,30–33,35,36]; 5 studies compared the addition of massage to other therapies compared to the other therapy alone[29,33,34,36,37]; 2 studies compared 2 different techniques of massage.[26,37] The comparisons are described below.

Massage *Versus* Inert Treatment (Placebo, Sham, Waiting List, or No Treatment). One study[36] with low risk of bias (51 people) showed that the massage was significantly better than sham laser on measurements of pain intensity and quality of pain. Pain intensity was measured on a scale from 0 (no pain) to 5 (maximal pain). The mean improvement in the massage group was 2.0 points on both short- and long-term follow-up. The mean improvement in pain intensity in the sham laser group was 0.35 and 0.25 points in the short- and long-term follow-up, respectively. Massage was also significantly better than sham laser on measurements of function (both short- and long-term). A difference in Roland-Morris Disability Questionnaire scores of 2.5 has been considered to be minimally important in terms of clinical effects.[36] When this criterion was applied, clinical significance was demonstrated in the massage group: 5.9 in the short-term and 6.8 in the long-term follow-up. The respective improvements in the sham laser group were 0.3 and 0.7. At 1-month follow-up, 63% of subjects in the massage therapy group reported no pain as compared with 0% of the sham laser therapy group.

One study[27] with high risk of bias (60 people) showed that one 30-minute session of deep cross-friction massage with the aid of a copper myofascial T-bar (roptrotherapy) applied to the lumbar pelvic region was significantly better than placebo and no treatment (waiting list) for reduction of pain and improvement in function in patients with subacute nonspecific LBP. Pain was measured on a visual analogue scale and lumbar function was assessed by the standard Oswestry Disability Index 1 week after the massage session. Pain changed from 56 mm to 37 mm in the massage group, from 57 mm to 59 mm in the placebo group, and from 49 mm to 52 mm in the waiting list control group. The Oswestry Disability Index changed from 34 to 16 in the massage group, from 36 to 38 in the placebo group, and from 29 to 31 in the waiting list control group.

The summary of findings is shown in Table 4.

Pain Relief. The study by Preyde used a pain scale from 0 to 5 and the study by Farasyn *et al* employed a 100-mm VAS, therefore the SMD of these 2 studies combined was −0.92 (95% confidence interval [CI]: −1.35 to −0.48) indicating a statistically significant improvement in pain with massage compared to a sham therapy.

Improvement in Disability. The study by Preyde used the Roland-Morris Disability Questionnaire (range: 0–24) and the study by Farasyn *et al* used a Oswestry Disability Index (range from 0% to 100%), therefore, the SMD of these 2 studies combined was −1.76 (95% CI: −3.19 to −0.32) indicating a statistically significant improvement in disability with massage compared to sham therapy.

Massage *Versus* Other Active Treatments

Comparison Between Massage and Spinal Manipulation or Joint Mobilization. One study[32] with low risk of bias (67 people) showed that patients receiving traditional Thai massage reported significantly less pain (measured

Table 4. Summary of Findings: Massage *Versus* Inert Therapies

Quality Assessment							Summary of Findings					
							No. Patients		Effect			
No. Studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other Considerations	Massage	Sham Treatment	Relative (95% CI)	Absolute	Quality	Importance
Pain intensity—short-term follow-up (better indicated by less)												
2	Randomized trial	Serious*	No serious inconsistency	No serious indirectness	No serious imprecision	None	45	46	—	SMD −0.92 (−1.35 to −0.48)	+++0 Moderate	
Pain intensity—long-term follow-up (better indicated by less)												
1	Randomized trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious†	None	25	26	—	SMD −0.49 (−1.05 to 0.06)	+++0 Moderate	
Function—back-specific—short-term follow-up (better indicated by less)												
2	Randomized trial	Serious*	No serious inconsistency	No serious indirectness	No serious imprecision	None	45	46	—	SMD −1.76 (−3.19 to −0.32)	+++0 Moderate	
Function—back-specific—long-term follow-up (better indicated by less)												
1	Randomized trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious†	None	22	24	—	SMD −0.96 (−1.58 to −0.35)	+++0 Moderate	

*One trial with high risk of bias (unsure of randomization, concealment, co-interventions; no blinding) and other with low risk of bias.
†Only one study.

by VAS) than patients in the joint mobilization group at 5 minutes after treatment evaluation. The mean difference was −0.94 (95% CI: −1.76 to −0.12). Both Thai massage and joint mobilization provided significant improvement in pain scores after treatment as compared to baseline values. The Thai massage group improved from 4.22 to 2.45, and the joint mobilization group improved from 4.35 to 3.39 on measures taken immediately post the sessions (mentioned in Table 5).

Comparison Between Massage and Exercise. One study[36] with low risk of bias (47 people), showed that patients who received massage did significantly better than the exercise group in measurements of pain and function in the short-term. The mean difference in pain in the short-term was −0.6 (95% CI: −10.3 to −0.17) and the mean difference in function in the short-term was −3.38 (95% CI: −5.96 to −0.8). The groups were similar on measurements of pain intensity and pain quality on the long-term follow-up (mentioned in Table 6).

Comparison Between Massage and Relaxation Therapy. There were 3 studies in total: 1 study[33] with low risk of bias (243 people) and 2 studies with high risk of bias done by the same group of researchers (30 people[28] and 24 people[35]).

The study by Poole *et al*[33] revealed that there were no significant differences in pain or functional evaluations among foot reflexology, progressive muscle relaxation, and usual care groups, at both the short- and long-term follow-ups. The mean difference in pain in the short-term was −2.90 (95% CI: −12.32–6.52) and in the long-term was −1.50 (95% CI: −12.24–9.24). The mean difference in function in the short-term was −3.60 (95% CI: −11.10–3.90) and in the long-term was −2.30 (95% CI: −9.99–5.39). All groups received usual care; however, components of usual treatment varied among the 3 groups, and included no treatment. There was a significant reduction of pain over time for all 3 groups and the effect was greatest in the reflexotherapy group.

The study by Field *et al*[28] showed that massage was significantly better than relaxation therapy performed at home, in terms of reducing pain, sleep disturbances, anxiety, and depressed mood in patients with LBP. Assessments were made after the first day of treatment and after the last day of treatment.

The study by Hernandes-Reif[35] showed that the immediate effects (prepost treatments) measured with the McGill pain questionnaire, revealed that both groups reported less pain after treatment, but more so on the first day of treatment. For the pain intensity measures, only the massage group experienced less pain immediately after their first and last treatment sessions. Com-

Table 5. Summary of Findings: Massage *Versus* Mobilization/Manipulation

Quality Assessment							Summary of Findings					
							No. Patients		Effect			
No. Studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other Considerations	Massage	Manipulation/ Mobilization	Relative (95% CI)	Absolute	Quality	Importance
Pain intensity—short-term follow-up (follow-up mean 5 min; measured with: VAS; better indicated by less)												
1	Randomized trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	35	32	—	MD −0.94 (−1.76 to −0.12)	+++0 Moderate	

*Only one study.

Table 6. Summary of Findings: Massage *Versus* Exercise

Quality Assessment							Summary of Findings					
							No. Patients		Effect			
No. Studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other Considerations	Massage	Exercises	Relative (95% CI)	Absolute	Quality	Importance
Pain intensity—Short-term follow-up (range of scores: 0–5; better indicated by less)												
1	Randomized trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	25	22	—	MD −0.6 (−1.03 to −0.17)	+++0 Moderate	
Pain intensity—long-term follow-up (range of scores: 0–5; better indicated by less)												
1	Randomized trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	22	21	—	MD −0.15 (−0.86 to 0.56)	+++0 Moderate	
Back-specific—short-term follow-up (measured with: Roland-Morris Disability Questionnaire†; range of scores: 0–24; better indicated by less)												
1	Randomized trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	25	22	—	MD −3.38 (−5.96 to −0.8)	+++0 Moderate	
Back-specific functional status—long-term follow-up (measured with: Roland-Morris Disability Questionnaire†; range of scores: 0–24; better indicated by less)												
1	Randomized trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	22	21	—	MD −2.85 (−5.28 to −0.42)	+++0 Moderate	

*Only 1 study.
†Scores >14 indicate poor outcomes.

parisons between the first and last days revealed that both groups perceived pain reduction based on the pretreatment pain measures.

It was not possible to combine all 3 studies in a meta-analysis because the study by Poole *et al* examined reflexology on the foot. The meta-analysis of the studies by Field and Hernandes-Reif was possible only for outcomes of pain intensity. The weighted mean difference of pain intensity in the short-term follow-up for these 2 studies combined was −1.27 (95% CI: −2.46; −0.08) (Table 7).

Comparison Between Massage and Acupuncture. One study with low risk of bias (172 people)[9] showed no significant difference in pain in the short-term, but there was a significant improvement in function. At 52 weeks, massage was superior to acupuncture in its effect on pain and function (Table 8).

Comparison Between Massage and Self-Care Education. One study with low risk of bias (168 people)[9] showed significant improvement in pain and function compared to the self-care education group after 10 weeks (ANCOVA, $P = 0.01$ and $P < 0.001$, respectively). These differences were not maintained at 52 weeks ($P = 0.42$ and $P = 0.97$, respectively) because the self-care education group demonstrated substantial improvements during this period (Table 9).

Comparison Between Acupuncture Massage and Physiotherapy (Including Traction, Manipulation, Thermotherapy, Infrared, Electrical Stimulation, and Exercise Therapy). The meta-analysis of 2 studies conducted by the same group, 1 study with high risk of bias (146 people)[30] and another with low risk of bias (129 people)[31] showed that acupuncture massage was significantly better than physiotherapy for pain both in the short- and long-term follow-ups. The SMD for pain in the short-term follow-up was −0.72 (95% CI: −0.96 to −0.47) and in the long-term follow-up, it was −0.95 (95% CI: −1.39 to −0.51). For function, 1 study with low risk of bias[31] showed that acupuncture massage was better than physiotherapy on both short- and long-term follow-ups. There is evidence that acupressure is more efficacious than physical therapy in alleviating LBP and improving

Table 7. Summary of Findings: Massage *Versus* Relaxation

Quality Assessment							Summary of Findings					
							No. Patients		Effect			
No. Studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other Considerations	Massage	Relaxation	Relative (95% CI)	Absolute	Quality	Importance
Pain intensity—short-term follow-up (measured with: VITAS1; range of scores: 0–10; better indicated by less)												
2	Randomized trial	Very serious†	No serious inconsistency	No serious indirectness	No serious imprecision	None	27	27	—	MD −1.27 (−2.46 to −0.08)	++00 Low	
Pain quality—short-term follow-up (measured with: SF-McGill Pain Questionnaire‡; better indicated by less)												
1	Randomised trial	Serious†	No serious inconsistency	No serious indirectness	Serious§	None	12	12	—	MD −2.3 (−6.91–2.31)	++00 Low	

*Present pain using VAS.
†H-R 2001 = high risk of bias (unsure of concealment, blinding of care provider and outcome assessor, cointerventions, intention-to-treat analysis; no patient blinding and no acceptable drop-out rate). Field 2007 = high risk of bias (unsure of randomization, concealment, group similarity at baseline, co-interventions, compliance, drop-out rate, and intention-to-treat analysis; no patient, care provider or outcome assessor blinding).
‡11 questions.
§Only 1 study.

Table 8. Summary of Findings: Massage *Versus* Acupuncture

Quality Assessment							Summary of Findings					
							No. Patients		Effect			
No. Studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other Considerations	Massage	Acupuncture	Relative (95% CI)	Absolute	Quality	Importance
Pain intensity/symptom bothersomeness—short-term follow-up (follow-up mean 10 wk; range of scores: 0–10; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	94	—	MD −0.4 (−0.5 to −0.3)	+++0 Moderate	
Pain intensity/symptom bothersomeness—long-term follow-up (follow-up mean 52 wk; range of scores: 0–10; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	94	—	MD −1.3 (−1.42 to −1.18)	+++0 Moderate	
Function—short-term follow-up (follow-up mean 10 wk; measured with: Modified Roland Disability Questionnaire; range of scores: 0–23; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	94	—	MD −1.6 (−1.79 to −1.41)	+++0 Moderate	
Function—long-term follow-up (follow-up mean 52 wk; measured with: Modified Roland Disability Questionnaire; range of scores: 0–23; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	94	—	MD −1.2 (−1.41 to −0.99)	+++0 Moderate	

*Only one study.

function, measured by a pain visual analogue scale, Roland and Morris Disability Questionnaire, and Oswestry Disability Index.

Massage as a Component of a Combined Therapy (Where the Effects of Massage Could Be Extracted Separately, or the Addition of Massage Was Compared to the Other Treatments Without Massage). One study[36] with low risk of bias (47 people) showed that patients who received massage combined with exercises and education were significantly better than the group that received exercises only, in measurements of function and pain intensity, on both short- and long-term measurements; and on measurements of quality of pain, in the short-term. However, massage combined with exercise and education was better than massage alone only on measurements of pain intensity, in the short-term.

One study[37] with low risk of bias (190 people) observed a marked improvement in those who had acupuncture massage added to group exercise. Acupuncture massage improved function (with individual or group exercises), but Classic massage did not. Most decrease in pain occurred in the group who received acupuncture massage plus individual exercises. Acupuncture massage (with individual or group exercise) reduced pain compared to classic massage. The mean difference between acupuncture and classic massage groups was 7.0% (Hanover Functional Score, range 0%–100%) and 0.8 cm (10-cm VAS).

One study[29] with high risk of bias (100 people) showed that massage therapy combined with specific adjuvant exercises appears to be beneficial in treating chronic LBP in short-term follow-up. Despite changes in pain, perceived function did not improve.

One study[33] with low risk of bias (122 people) showed that the addition of reflexology to usual general practitioners' care was not better than usual care alone (for short-form [SF]-36 pain, VAS pain, and Oswestry Disability Questionnaire). However, the amount and type of procedures varied between the groups, and there was a difference in the number of patients who receive no intervention, described as usual care. This might have been caused by poor randomization and results were analyzed after adjustment for pretreatment scores.

Table 9. Summary of Findings: Massage *Versus* Self-Care

Quality Assessment							Summary of Findings					
							No. Patients		Effect			
No. Studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other Considerations	Massage	Self-Care Education	Relative (95% CI)	Absolute	Quality	Importance
Pain intensity/symptom bothersomeness—short-term follow-up (follow-up mean 10 wk; range of scores: 0–10; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	90	—	MD −1 (−1.11 to −0.89)	+++0 Moderate	
Pain intensity/symptom bothersomeness—long-term follow-up (follow-up mean 52 wk; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	90	—	MD −0.6 (−0.72 to −0.48)	+++0 Moderate	
Function—short-term follow-up (follow-up mean 10 wk; measured with: Modified Roland Disability Questionnaire; range of scores: 0–23; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	90	—	MD −2.5 (−2.7 to −2.3)	+++0 Moderate	
Function—long-term follow-up (follow-up mean 52 wk; measured with: Modified Roland Disability Questionnaire; range of scores: 0–23; better indicated by less)												
1	Randomised trial	No serious limitations	No serious inconsistency	No serious indirectness	Serious*	None	78	90	—	MD 0.4 (0.19 to 0.61)	+++0 Moderate	

*Only one study.

One study[34] with high risk of bias (61 people) showed that acupuncture massage added to a course of usual care (not described in detail) was better than usual care alone for measures of pain in the short-term follow-up, but not for measures of function in short-term follow-up. The acupuncture massage group had 39% greater reduction in pain intensity than the usual care group at 1 week after the end of treatment ($P = 0.0001$). There was no significant difference in measures of daily activities between the 2 groups.

Different Techniques of Massage. One study[37] with low risk of bias (190 people) compared acupuncture massage to classic (Swedish) massage. Each massage therapy group also received 1 of 2 types of exercise programs (individual or in group). This study showed that acupuncture massage was superior to classic massage (irrespective of the type of exercise received) on measures of both pain and function.

One study[26] with low risk of bias (180 people) compared traditional Thai massage with Swedish massage. Both massage techniques can be used, with equal expected effectiveness, in the treatment of back pain associated with myofascial trigger points. There was no significant difference in the degree of pain reduction between the 2 groups at the end of 3 weeks. The difference between groups was 0.2 (95% CI: −0.4–0.7) or at the evaluation 1 month later the difference between groups was 0.2 (95% CI: −0.8–0.4). Both traditional Thai massage (decrease of 3.3 in the VAS scores, 95% CI: 2.8–3.7) and Swedish massage (decrease of 3.2 in the VAS scores, 95% CI: 2.8–3.7) provided significant improvement in pain scores after treatment compared to baseline values.

Experience of the Therapist. The most significant benefits were observed in the studies that used a trained massage therapist with many years of experience or a licensed massage therapist.[9,35,36]

Costs. In 1 study,[36] the cost of 6 sessions of massage combined with exercise and education was CAN $300, while massage alone cost CAN $240, and exercise alone and sham laser cost CAN $90 each. In this study, massage combined with exercise and education had the most significant effects but cost more. In another study,[9] the cost of massage was US $377 per patient, acupuncture cost US $352, and self-care education cost US $50 per patient. However, the number of provider visits, pain medication, and costs of outpatient HMO back care services were about 40% lower in the massage group than in the other groups.

Work-Related Outcomes. Two trials, (1 study with low risk of bias with 129 people[31] and other with high risk of bias with 61 people[34] evaluated work-related outcome measures. The mean scores for pain interfering with normal work, days cut down on doing things and days off from work or school, were significantly lower for patients who received acupressure than those in the physical therapy group.[31] Electrical stimulation on acupuncture points followed by acupressure with aromatic lavender oil had no significant effects on housework, work, or leisure time.[34] Massage treatment to the entire back, legs, and knees using a Biotone oil did not change the rate of absenteeism or of job productivity level measured by a self-report scale in short-term follow-up.[28]

Harms. No serious adverse events were reported by any patients in the studies reviewed. Some massage techniques such as deep friction, compression, or ischemic compression might produce postmassage soreness and ecchymosis. In 1 study with low risk of bias,[26] 19 participants (11%) reported temporary (10–15 minutes) soreness after treatment on day 1 and 22 (12%) after treatment in week 3. In another study with low risk of bias,[9] 10 participants (13%) reported significant discomfort or pain during or shortly after treatment. When massage oil was applied, allergic reaction such as rashes or pimples occurred in 5 people (6%).[26] No direct adverse effects were reported in the group receiving acupressure.[30] In the study,[34] there were also no adverse events observed.

■ Discussion

We updated our previous review[16] with 9 recently published RCTs. Our conclusions do not differ from our previous review. Our findings suggest that massage might be beneficial for patients with subacute and chronic nonspecific LBP, especially if combined with exercise and delivered by a licensed therapist. The studies suggest that massage has long-lasting effects (at least 1 year). One study showed that acupuncture massage was better than classic (Swedish) massage, and another trial showed that Thai massage is similar to classic (Swedish) massage.

Two studies attempted to have an inert treatment group. Pryde[36] employed a sham treatment that controlled for the interpersonal contact and support. Farasyn *et al*[27] used a placebo massage therapy and a waiting list control group.

Statistical pooling was not possible in most of the comparisons because the studies were very heterogeneous in relation to the population, massage technique, comparison group, timing, and type of outcome measures. Massage is a global treatment and its effects are difficult to measure because of various confounding variables, including the size of the massage area, amount of pressure, different types of maneuvers, duration and number of treatment sessions, experience of therapist, level of stress, and heterogeneity of participants. Other criticisms of these trials are the paucity of cost-benefits analysis, and lack of discussion of clinical relevance of the results.

Our methodology to conduct this systematic review was improved in relation to our previous version. We invited a registered massage therapist to evaluate the ad-

equacy and relevance of the massage therapy delivered in the studies. The methodologic quality assessment was done by 2 independent review authors. Although the rating system has not been validated, it is recommended for trials of LBP and has been used in many systematic reviews in this field.[20] The definition of a study with low risk of bias is somewhat arbitrary, but in the previous version of this review we conducted a sensitivity analysis that showed that changing the threshold to 40% or 60% did not make any significant difference.

■ Conclusion

Implications for Practice

Massage is beneficial for patients with subacute and chronic nonspecific LBP in terms of improving symptoms and function. Massage therapy is costly, but it may save money in health care provider visits, pain medications, and costs of back care services. The effects of massage are improved if combined with exercise and education. The beneficial effects of massage in patients with chronic LBP are long lasting (at least 1 year after end of sessions). It seems that acupuncture massage is better than classic massage, but this needs confirmation. Adding foot reflexology to usual care is not better than usual care alone.

Implications for Research

There are many possibilities for control groups for massage trials. Factorial design can be used to assess the effectiveness of treatments alone or in combination.[47] Because most outcomes in LBP are subjective measures, the ideal control group is one that ensures the treatments are equally credible and acceptable to patients to minimize placebo effects and high dropout rates.[48] There is a need to confirm if acupuncture massage is better than classic massage. There are numerous techniques of massage therapy, and each one needs to be evaluated for effectiveness and cost-effectiveness. There are also different settings (private practice, hospital, primary care, pain clinics) and populations (acute or chronic pain, presence of other aggravating factors, different countries with different cultures) that need to be assessed separately. Future trials may also consider whether the benefits of massage can be increased if the therapist has many years of experience or is a licensed therapist.

Trials should examine the role of session length by including 2 (or more) levels of this variable, and the experience of the therapist by employing various people with different experience and training. Authors should discuss the clinical relevance of the results; include return-to-work as an outcome and long-term follow-up. Authors are encouraged to follow the CONSORT statement for reporting their trials[49] and use the standard outcomes for trials of LBP as described by Deyo *et al*,[19] in order to provide homogenous information for future systematic reviews and meta-analyses. When presenting the results, researchers are encouraged to show the baseline characteristics using point estimates (mean, median) with standard deviations (for continuous variables), and the number of patients in each category (for categorical variables) and for every follow-up measure. When researchers present only the difference between the baseline and the follow-up, these data cannot be pooled with studies that report both baseline and follow-up values.

Acknowledgments

The authors thank Dr. Sergio Terreri for his help in translating and extracting the data from the German article; Dr. Annegret Franke (author of one included trial) for double checking the data extracted from her article and for providing more information about the trial; Vivian (Robinson) Welch, Jean Wong, and Lucie Brosseau, the 3 coauthors of the first and second versions of this review, for their assistance and participation; the editors of the Back Review Group for their excellent comments and suggestions; Vicki Pennick for proof-reading this review; and Rachel Couban, the trials search coordinator.

■ Key Points

- This systematic review included 13 randomized trials of massage for low back pain.
- Two studies compared massage to inert treatment (sham therapies) and showed that massage was superior for pain and function on both short- and long-term follow-ups.
- Massage was similar or superior than other conservative therapies such as exercises, mobilization, relaxation, physical therapy, acupuncture, and self-care education.
- The benefits of massage were increased when combined with exercises and education.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text, and links to the digital files are provided in the HTML text of this article on the journal's Web site (www.spinejournal.com).

References

1. Andersson GBJ. Epidemiological features of chronic low-back pain. *Lancet* 1999;354:581–5.
2. Waddell G. *The Back Pain Revolution*. Edinburgh, UK: Churchill-Livingstone; 1998.
3. Van Tulder M, Koes B, Bouter L. Conservative treatment of acute and chronic nonspecific low back pain: a systematic review of randomized controlled trials of the most common interventions. *Spine* 1997;22:2128–56.
4. Ernst E. Massage therapy for low back pain: a systematic review. *J Pain Symptom Manage* 1999;17:65–9.
5. Melzack R, Wall PD. *The Challenge of Pain*. London, UK: Penguin Books; 1996.
6. Moyer CA, Rounds J, Hannum JW. A meta-analysis of massage therapy research. *Psychol Bull* 2004;130:3–18.
7. Wainapel SF, Thomas AD, Kahan BS. Use of alternative therapies by rehabilitation outpatients. *Arch Phys Med Rehabil* 1998;79:1003–5.
8. Vickers A, Zollman C. ABC of complementary medicine. Massage therapies. *BMJ* 1999;319:1254–7.
9. Cherkin DC, Eisenberg D, Sherman KJ, et al. Randomized trial comparing traditional Chinese medical acupuncture, therapeutic massage, and self-care education for chronic low back pain. *Arch Intern Med* 2001; 161:1081–8.
10. Jensen OK, Nielsen F, Vosmar L. An open study comparing manual therapy

with the use of cold packs in the treatment of post-traumatic headache. *Cephalalgia* 1990;10:241–50.
11. Weber MD, Servedio FJ, Woodall WR. The effects of three modalities on delayed onset muscle soreness. *J Orthop Sports Phys Ther* 1994;20:236–42.
12. Weinrich SP, and Weinrich MC. The effect of massage on pain in cancer patients. *Appl Nurs Res* 1990;3:140–5.
13. Gross AR, Aker PD, Goldsmith CH, et al. Physical medicine modalities for mechanical neck disorders. *Cochrane Database Syst Rev* 1999.
14. Furlan AD, Brosseau L, Welch V, et al. Massage for low back pain. *Cochrane Database Syst Rev* 2000.
15. Furlan AD, Brosseau L, Imamura M, et al. Massage for low-back pain: a systematic review within the framework of the Cochrane Collaboration Back Review Group. *Spine* 2002;27:1896–910.
16. Furlan AD, Brosseau L, Imamura M, et al. Massage for low back pain. *Cochrane Database Syst Rev* 2002:CD001929.
17. Philadelphia Panel. Philadelphia Panel evidence-based clinical practice guidelines on selected rehabilitation interventions for low back pain. *Phys Ther* 2001;81:1641–74.
18. Sherman KJ, Dixon MW, Thompson D, et al. Development of a taxonomy to describe massage treatments for musculoskeletal pain. *BMC Complement Altern Med* 2006;6:1–7.
19. Deyo R, Battie M, Beurskens A, et al. Outcome measures for low back pain research. A proposal for standardized use. *Spine* 1998;23:2003–13.
20. van Tulder MW, Furlan A, Bombardier C, et al; the Editorial Board of the Cochrane Collaboration Back Review. Updated Method Guidelines for Systematic Reviews in the Cochrane Collaboration Back Review Group. *Spine* 2003;28:1290–9.
21. Atkins D, Best D, Briss PA, et al. Grading quality of evidence and strength of recommendations. *BMJ* 2004;328:1490.
22. Godfrey CM, Morgan PP, Schatzker J. A randomized trial of manipulation for low-back pain in a medical setting. *Spine* 1984;9:301–4.
23. Hoehler FK, Tobis JS, Buerger AA. Spinal manipulation for low back pain. *JAMA* 1981;245:1835–8.
24. Melzack R, Vetere P, Finch L. Transcutaneous electrical nerve stimulation for low back pain: a comparison of TENS and massage for pain and range of motion. *Phys Ther* 1983;63:489–93.
25. Pope MH, Philips RB, Haugh LD, et al. A prospective randomized three-week trial of spinal manipulation, transcutaneous muscle stimulation, massage and corset in the treatment of subacute low back pain. *Spine* 1994;19:2571–7.
26. Chatchawan U, Thinkhamrop B, Kharmwan S, et al. Effectiveness of traditional Thai massage versus Swedish massage among patients with back pain associated with myofascial trigger points. *J Bodyw Mov Ther* 2005;9:298–309.
27. Farasyn A, Meeusen R, Nijs J. A pilot randomized placebo-controlled trial of roptrotherapy in patients with subacute non-specific low back pain. *J Back Musculoskeletal Rehabil* 2006;19:111–7.
28. Field T, Hernandez-Reif M, Diego M, et al. Lower back pain and sleep disturbance are reduced following massage therapy. *J Bodyw Mov Ther* 2007;11:141–5.
29. Geisser ME, Wiggert EA, Haig AJ, et al. A randomized controlled trial of manual therapy and specific adjuvant exercise for chronic low back pain. *Clin J Pain* 2005;21:463–70.
30. Hsieh LLC, Kuo CH, Yen MF, et al. A randomized controlled clinical trial for low back pain treated by acupressure and physical therapy. *Prev Med* 2004;39:168–76.
31. Hsieh LLC, Kuo CHK, Lee LH, et al. Treatment of low back pain by acupressure and physical therapy: randomised controlled trial. *BMJ* 2006;332:1–5.
32. Mackawan S, Eungpinichpong W, Pantumethakul R, et al. Effects of traditional Thai massage versus joint mobilization on substance P and pain perception in patients with non-specific low back pain. *J Bodyw Mov Ther* 2007;11:9–16.
33. Poole H, Glenn S, Murphy P. A randomised controlled study of reflexoloty for the management of chronic low back pain. *Eur J Pain* 2007;11:878–87.
34. Yip YB, Tse SHM. The effectiveness of relaxation acupoint stimulation and acupressure with aromatic lavender essential oil for non-specific low back pain in Hong Kong: a randomised controlled trial. *Complement Ther Med* 2004;12:28–37.
35. Hernandez-Reif M, Field T, Krasnegor J,. Lower back pain is reduced and range of motion increased after massage therapy. *Int J Neurosci* 2001;106:131–45.
36. Preyde M. Effectiveness of massage therapy for subacute low-back pain: a randomized controlled trial. *CMAJ* 2000;162:1815–20.
37. Franke A, Gebauer S, Franke K, et al. Acupuncture massage vs Swedish massage and individual exercise vs. group exercise in low back pain sufferers—-a randomized controlled clinical trial in a 2 x 2 factorial design. *Forsch Komplementarmed Klass Naturheilkd* 2000;7:286–93.
38. Ferrell BA, Josephson KR, Pollan AM, et al. A randomized trial of walking versus physical methods for chronic pain management. *Aging (Milano)* 1997;9:99–105.
39. Ginsberg F, Famaey JP. A double-blind study of topical massage with Rado-Salil ointment in mechanical low-back pain. *J Int Med Res* 1987;15:148–53.
40. Kankaanpaa M, Taimela S, Airaksinen O, et al. The efficacy of active rehabilitation in chronic low back pain. Effect on pain intensity, self-experienced disability, and lumbar fatigability. *Spine* 1999;24:1034–42.
41. Koes BW, Bouter LM, Van Mameren H, et al. A randomized clinical trial of manual therapy and physiotherapy for persistent back and neck complaints: subgroup analysis and relationship between outcome measures. *J Manipulative Physiol Ther* 1993;16:211–9.
42. Konrad K, Tatrai T, Hunka A, et al. Controlled trial of balneotherapy in treatment of low back pain. *Ann Rheum Dis* 1992;51:820–2.
43. Lindstrom A, Zachrisson M. Physical therapy on low back pain and sciatica. An attempt at evaluation. *Scand J Rehab Med* 1970;2:37–42.
44. Maniche C, Hesselsce G, Bentzen L, et al. Clinical trial of intensive muscle training for chronic low back pain. *Lancet* 1988;2:1473–6.
45. Melzack R, Jeans ME, Stratford JG, et al. Ice massage and transcutaneous electrical stimulation: comparison of treatment for low-back pain. *Pain* 1980;9:209–17.
46. Werners R, Pynsent PB, Bulstrode CJ. Randomized trial comparing interferential therapy with motorized lumbar traction and massage in the management of low back pain in a primary care setting. *Spine* 1999;24:1579–84.
47. Ezzo J. What can be learned from Cochrane systematic reviews of massage that can guide future research? *J Altern Complement Med* 2007;13:291–5.
48. Haraldsson BG, Gross AR, Myers CD, et al. Massage for mechanical neck disorders. *Cochrane Database Syst Rev* 2006.
49. Moher D, Schulz KF, Altman DG, et al. The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomized trials. *Ann Intern Med* 2001;134:657–62.