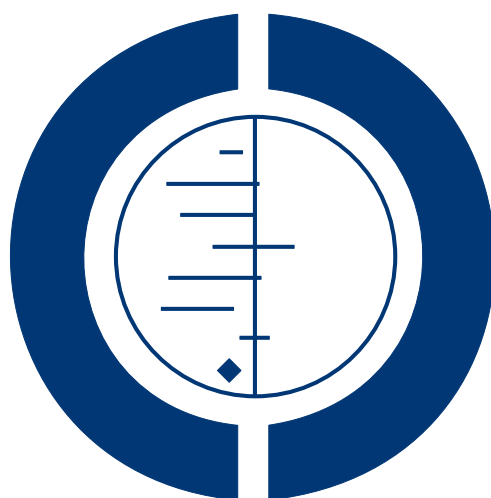


Massage for low-back pain (Review)

Furlan AD, Imamura M, Dryden T, Irvin E



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Massage for low-back pain (Review)

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[Intervention Review]

Massage for low-back pain

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ABSTRACT

Background

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.

Objectives

To assess the effects of massage therapy for non-specific low-back pain.

Search 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.

Selection criteria

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 non-specific low-back pain.

Data collection and analysis

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.

Main results

Thirteen randomized trials were included. Eight had a high risk and five 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 two studies that showed that massage was superior for pain and function on both short and long-term follow-ups. In eight 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 one year after the end of the treatment. Two studies compared two 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.

Massage for low-back pain (Review)

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Authors' conclusions

Massage might be beneficial for patients with subacute and chronic non-specific low-back pain, especially when combined with exercises and education. The evidence suggests that acupuncture massage is more effective than classic massage, but this needs 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.

PLAIN LANGUAGE SUMMARY

Massage for low-back pain

Low-back pain (LBP) is one of the most common and costly musculoskeletal problems in modern society. Seventy to 85% of the population will experience LBP at some time in their lives. Proponents of massage therapy claim it can minimize pain and disability, and speed return to normal function.

Massage in this review is defined as soft-tissue manipulation using hands or a mechanical device on any body part. Non-specific LBP indicates that no specific cause is detectable, such as infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, inflammatory process or radicular syndrome (pain, tingling or numbness spreading down the leg).

Thirteen randomized trials (1596 participants) assessing various types of massage therapy for low-back pain were included in this review. Eight had a high risk and five had a low risk of bias. Massage was more likely to work when combined with exercises (usually stretching) and education. The amount of benefit was more than that achieved by joint mobilization, relaxation, physical therapy, self-care education or acupuncture. It seems that acupressure or pressure point massage techniques provide more relief than classic (Swedish) massage, although more research is needed to confirm this.

No serious adverse events were reported by any patient in the included studies. However, some patients reported soreness during or shortly after the treatment. Some patients also reported an allergic reaction (e.g. rash or pimples) to the massage oil.

In summary, massage might be beneficial for patients with subacute (lasting four to 12 weeks) and chronic (lasting longer than 12 weeks) non-specific low-back pain, especially when combined with exercises and education.

BACKGROUND

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 (Andersson 1999). Each year, 5% to 10% of the workforce is off work because of their LBP, the majority for less than seven 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 (Waddell 1998).

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 (Van Tulder 1997b).

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 physiological 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 (Ernst 1999). The gate-control theory predicts that massaging a particular area stimulates large diameter nerve fibres. These fibres 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 fibres (nociceptive fibres) have an excitatory input) and pain relief follows (Melzack 1996). 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 (Moyer 2004). 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 “acupresure”. In 1998/99, almost 17% of the Canadian population aged 18 or older reported they had sought the care of alternative health care practitioners in the previous year. These included: chiropractors, massage therapists, acupuncturists, homeopaths and naturopaths. The most common indication was chronic pain, including back problems (Health Reports 2001). In 1998, Wainapel surveyed an urban rehabilitation medicine outpatient office in New York to address the use of alternative therapy and their perceived effectiveness (Wainapel 1998). 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, non-consolidated fracture, burn area, deep vein thrombosis or over sites of active cancer tumour (Vickers 1999b). Minor pain or discomfort was experienced by 13% of participants during or shortly after receiving massage (Cherkin 2001).

Massage has been investigated in the pain management area for its efficacy in relieving headaches (Jensen 1990), post-exercise muscle pain (Weber 1994), cancer pain (Weinrich 1990) and mechanical neck pain (Gross 1999). 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 six specific effects out of nine that were examined. Significant results were found within the single-dose and multiple-dose categories, and for both physiological and psychological outcome variables. (Moyer 2004)

Our previous systematic review (Furlan 2002) concluded that massage was beneficial for chronic low-back pain, 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 non-specific 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 (CCTs) with no language restrictions were included. Abstracts of ongoing studies were included.

Types of participants

- Adults (older than 18 years) with acute (less than four weeks), sub-acute (four to 12 weeks) or chronic (more than 12 weeks) non-specific LBP (Philadelphia 2001)
- LBP is defined as pain localized from the costal margin or 12th rib to the inferior gluteal fold (Waddell 2000)
- Non-specific 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 2006 to include studies in this review. The taxonomy was conceptualized as a three-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 (see [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) that 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 five 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)

Physical examination measures such as range of motion (ROM), spinal flexibility, degrees of straight leg raising (SLR) 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 ([Deyo 1998](#)). The timing of the outcome measurements were divided into two categories: 1) short-term: when the outcome assessment was taken from the end of the intervention period up to three months after randomization, and 2) long-term: when the outcome assessment was taken more than three months after randomization.

Search methods for identification of studies

The following databases were searched:

- The Cochrane Central Register of Controlled Trials (CENTRAL), in *The Cochrane Library* 2006, Issue 3.
- MEDLINE from 1966 to May 2008 using OVID (for search strategy, see [Appendix 1](#)).
- HealthSTAR from 1991 to August 2006, using OVID 3.0
- CINAHL from 1982 to May 2008 using OVID (for search strategy, see [Appendix 1](#)).
- EMBASE from 1980 to May 2008, using OVID (for search strategy, see [Appendix 1](#)).
- 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 (USA), Fundacion Kovacs (Spain), National Center for Complementary

& Alternative Medicine from the National Institute of Health (USA), National Association of Nurse Massage Therapists (USA), Rolf Institute (USA).

- 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 ([van Tulder 2003](#)) was used to find controlled trials for spinal diseases. The search strategies were reviewed and conducted by an expert librarian (Emma Irvin) and the Cochrane Back Review Group Trials Search Coordinator (Rachel Courban).

Data collection and analysis

Selection of the papers

One review author (EI) 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 (AF and MI), applied the inclusion criteria described above. One review author (AF) 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 (AF, TD or MI) assessed the risk of bias of each paper. 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 ([van Tulder 2003](#)), which are shown in [Table 2](#). Each criteria was scored as “yes”, “no” or “don’t know”. The risk of bias assessment of the studies was used for two 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 six 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 six 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 (AF, TD or MI) 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 (WMD) when the outcome measures were identical, and standardized mean difference (SMD) when the outcome measures were different. Statistical pooling 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 (GRADE 2004). 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 two RCTs with low potential for bias that are generalizable to the population in question. There are sufficient data, with narrow confidence intervals. There are no known or suspected reporting biases.

Moderate quality evidence = one of the factors is not met

Low quality evidence = two of the factors are not met

Very low quality evidence = three of the factors are not met

No evidence = no evidence from RCTs

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

In our previous review, we had identified nine publications reporting on eight trials. However, we decided to exclude four of these trials in this current update because the massage therapy

was not judged to be appropriate (Godfrey 1984; Hoehler 1981; Melzack 1983; Pope 1994). The reasons for exclusion of these and other trials are explained in the *Characteristics of excluded studies* table. For this updated review, we identified nine additional randomized controlled trials that were published after our previous review (Chatchawan 2005; Farasyn 2006; Field 2007; Geisser 2005a; Hsieh 2004; Hsieh 2006; Mackawan 2007; Poole 2007; Yip 2004).

In total, we included 13 trials (1596 participants) in this updated review. Four studies were conducted in the USA (416 participants - Cherkin 2001; Field 2007; Geisser 2005a; Hernandez-Reif 2001), two in Taiwan (275 participants - Hsieh 2004; Hsieh 2006) two in Thailand (247 participants - Chatchawan 2005; Mackawan 2007) one in Canada (104 participants - Preyde 2000), one in Hong Kong (61 participants - Yip 2004) one in Germany (190 participants - Franke 2000) one in the UK (243 participants - Poole 2007) and one in Belgium (60 participants - Farasyn 2006). 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 non-specific LBP, but differed with respect to the diagnoses, duration of pain, previous treatments and distributions of age. One trial included participants with acute low-back pain (Yip 2004), three trials included patients with subacute and chronic low-back pain (Hsieh 2004; Hsieh 2006; Preyde 2000) and five trials were limited to patients with chronic pain (Chatchawan 2005; Cherkin 2001; Franke 2000; Geisser 2005a; Hernandez-Reif 2001).

The types of massage technique, duration and frequency of treatments varied among the studies. In two studies massage was applied with a mechanical device (Farasyn 2006; Franke 2000) while in the remaining studies it was done with hands. Two studies used a specific oil (Field 2007; Yip 2004). In two studies distinct techniques of massage were compared (Chatchawan 2005; Franke 2000).

With respect to the outcome measures, pain intensity was used in all of the studies. Three studies (Hernandez-Reif 2001; Hsieh 2004; Preyde 2000) also included other dimensions of pain, i.e. pain characteristics/quality. Nine studies assessed function/disability (Chatchawan 2005; Cherkin 2001; Farasyn 2006; Franke 2000; Geisser 2005a; Hsieh 2006; Poole 2007; Preyde 2000; Yip 2004). Work-related outcomes were assessed in three studies (Field 2007; Hsieh 2006; Yip 2004) and costs were reported in only two studies (Cherkin 2001; Preyde 2000). 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 is given in the *Characteristics of included studies* table.

Many controlled trials were found that studied massage associated with other therapies (Ferrell 1997; Ginsberg 1987; Kankaanpaa 1999; Koes 1993; Konrad 1992; Lindstrom 1970; Maniche 1988;

Melzack 1980; Werners 1999). 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. Details about these studies and the reasons for exclusion are described in the *Characteristics of excluded studies* table.

Risk of bias in included studies

The maximum number of criteria that could be met was 11. The number of criteria met ranged from one to eight, 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 six 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 studies. However, concealment of allocation was appropriate in only four studies and it was unclear if it was done or not in seven studies.

Only one study attempted to blind the patients to the assigned intervention (Geisser 2005a). In this study, the patients were randomized to four 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 disagree and 7 = completely agree). There was no significant difference between the groups. Four studies attempted to blind the outcome assessors (Cherkin 2001; Geisser 2005a; Mackawan 2007; Preyde 2000). 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.

For more details about the risk of bias for each article see [Figure 1](#).

Figure I. Summary of risks of bias

	Adequate sequence generation?	Allocation concealment?	Blinding? (All outcomes - patients?)	Blinding? (All outcomes - providers?)	Blinding? (All outcomes - outcome assessor?)	Incomplete outcome data addressed? (All outcomes - drop-outs?)	Incomplete outcome data addressed? (All outcomes - ITT analysis?)	Similarity of baseline characteristics?	Co-interventions avoided or similar?	Compliance acceptable?	Timing outcome assessments similar?
Chatchawan 2005	+	+	-	-	-	+	+	+	+	+	+
Cherkin 2001	+	+	-	?	+	+	+	+	+	+	+
Farasyn 2006	?	?	-	-	-	+	+	-	?	+	+
Field 2007	?	?	-	-	-	?	?	?	?	?	+
Franke 2000	+	+	-	-	-	+	-	-	+	+	+
Geisser 2005a	?	?	+	-	+	+	-	-	?	+	+
Geisser 2005b		?									
Hernandez-Reif 2001	+	?	-	?	?	-	?	+	?	+	+
Hsieh 2004	+	+	-	-	-	+	+	-	?	+	+
Hsieh 2006	+	+	-	-	-	+	+	+	?	+	+
Mackawan 2007	+	?	-	-	+	+	+	?	?	+	+
Poole 2007	+	?	-	-	-	+	-	?	-	?	+
Preyde 2000	+	+	?	?	+	+	+	+	+	+	+
Yip 2004	+	?	-	-	-	+	+	+	?	?	+

Effects of interventions

The studies compared massage therapy to various control treatments:

Two studies employed an inert (placebo or sham) control group (Farasyn 2006; Preyde 2000). Eight studies compared massage to various active treatments (Cherkin 2001; Field 2007; Hernandez-Reif 2001; Hsieh 2004; Hsieh 2006; Mackawan 2007; Poole 2007; Preyde 2000). Five studies compared the addition of massage to other therapies compared to the other therapy alone (Franke 2000; Geisser 2005a; Poole 2007; Preyde 2000; Yip 2004)

Two studies compared two different techniques of massage (Chatchawan 2005; Franke 2000). The comparisons are described below.

1) Massage versus inert treatment (placebo, sham, waiting list or no treatment).

One study with low risk of bias (51 people; Preyde 2000) showed that massage was significantly better than sham laser on measurements of pain intensity and quality of pain. Pain intensity was measured on a scale from zero (no pain) to five (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 func-

tion (both short and long-term). A difference in Roland-Morris Disability Questionnaire (RMDQ) scores of 2.5 has been considered to be minimally important in terms of clinical effects (Preyde 2000). 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 one-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 with high risk of bias (60 people; Farasyn 2006) 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 sub-acute non-specific LBP. Pain was measured on a visual analogue scale and lumbar function was assessed by the standard Oswestry Disability Index (ODI) one 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 ODI 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 meta-analysis of these two studies was possible only for the short-term follow-up outcomes (see Figure 2):

Figure 2.

Author(s): Andrea D Furlan, Marta Imamura, Trish Dryden, Emma Irvin
Date: 2008-08-07
Question: Should massage vs sham treatment be used for low-back pain?
Settings:
Bibliography: Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews 2008, Issue 4.

Quality assessment							Summary of findings				Importance
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	No of patients		Effect		
							massage	sham treatment	Relative (95% CI)	Absolute	
Pain intensity - Short-term follow-up (range of scores: -; Better indicated by less)											
2	randomised trial	serious ¹	no serious inconsistency	no serious indirectness	no serious imprecision	none	45	46	-	SMD - 0.92 (-1.35 to -0.48)	⊗⊗⊗⊗ MODERATE
Pain intensity - Long-term follow-up (range of scores: -; Better indicated by less)											
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ²	none	25	26	-	SMD - 0.49 (-1.05 to 0.06)	⊗⊗⊗⊗ MODERATE
Back-specific - Short-term follow-up (range of scores: -; Better indicated by less)											
2	randomised trial	serious ¹	no serious inconsistency	no serious indirectness	no serious imprecision	none	45	46	-	SMD - 1.76 (-3.19 to -0.32)	⊗⊗⊗⊗ MODERATE
Back-specific - Long-term follow-up (range of scores: -; Better indicated by less)											
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ²	none	22	24	-	SMD - 0.96 (-1.58 to -0.35)	⊗⊗⊗⊗ MODERATE

¹ one trial with high risk of bias (unsure of randomization, concealment, co-interventions, no blinding) and one trial with low risk of bias

² only one study

Pain relief:

The study by [Preyde 2000](#) used a pain scale from zero to five and the study by [Farasyn 2006](#) employed a 100-mm VAS, therefore the standardized mean difference (SMD) of these two 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 2000](#) used the Roland-Morris Disability Questionnaire (range 0 to 24) and the study by [Farasyn 2006](#) used a Oswestry Disability Index (range from 0 to 100%), therefore, the standardized mean difference (SMD) of these two 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.

2) Massage versus other active treatments

2a) Comparison between massage and spinal manipulation or joint mobilization

One study with low risk of bias (67 people) ([Mackawan 2007](#)) showed that patients receiving traditional Thai massage reported significantly less pain (measured by VAS) than patients in the joint mobilization group at five 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 (see [Figure 3](#)).

Figure 3.

Author(s): Andrea D Furlan, Marta Imamura, Trish Dryden, Emma Irvin
 Date: 2008-08-07
 Question: Should massage vs manipulation/mobilization be used for low-back pain?
 Settings:
 Bibliography: Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews 2008, Issue 4.

Quality assessment							Summary of findings				Importance	
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	No of patients		Effect			Quality
							massage	manipulation/mobilization	Relative (95% CI)	Absolute		
Pain intensity - Short-term follow-up (follow-up mean 5 minutes; measured with: VAS; range of scores: -; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	35	32	-	not pooled	⊗⊗⊗○ MODERATE	

¹ only one study

2b) Comparison between massage and exercise

One study with low risk of bias (47 people; [Preyde 2000](#)), 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 (see [Figure 4](#)).

Figure 4.

Author(s): Andrea D Furlan, Marta Imamura, Trish Dryden, Emma Irvin
 Date: 2008-08-07
 Question: Should massage vs exercises be used for low-back pain?
 Settings:
 Bibliography: Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews 2008, Issue 4.

Quality assessment							Summary of findings				Importance	
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	No of patients		Effect			Quality
							massage	exercises	Relative (95% CI)	Absolute		
Pain intensity - Short-term follow-up (range of scores: 0-5; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	25	22	-	not pooled	⊗⊗⊗○ MODERATE	
Pain intensity - Long-term follow-up (range of scores: 0-5; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	22	21	-	not pooled	⊗⊗⊗○ MODERATE	
Back-specific - Short-term follow-up (measured with: Roland-Morris Disability Questionnaire²; range of scores: 0-24; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	25	22	-	not pooled	⊗⊗⊗○ MODERATE	
Back-specific functional status - Long-term follow-up (measured with: Roland-Morris Disability Questionnaire²; range of scores: 0-24; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	22	21	-	not pooled	⊗⊗⊗○ MODERATE	

¹ only one study

² scores >14 indicate poor outcomes

2c) Comparison between massage and relaxation therapy

There were three studies in total: one study with low risk of bias (243 people; [Poole 2007](#)) and two studies with high risk of bias done by the same group of researchers (30 people; [Field 2007](#)) (24 people; [Hernandez-Reif 2001](#)).

The study by [Poole 2007](#) 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 to 6.52) and in the long term was -1.50 (95% CI: -12.24 to 9.24). The mean difference in function in the short-term was -3.60 (95% CI: -11.10 to 3.90) and in the long term was -2.30 (95% CI: -9.99 to 5.39). All groups received usual care, however, components of usual treatment varied among the three groups, and included no treatment. There was a significant reduction of pain over time for all three groups ($F_{1,138}=8.18$, $P < 0.0005$) and the effect was greatest in the reflexotherapy group.

The study by [Field 2007](#) 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 low-back pain. Assessments were made after the first day of treatment and after the last day of treatment.

The study by [Hernandez-Reif 2001](#) showed that the immediate effects (pre-post 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. Comparisons between the first and last days revealed that both groups perceived pain reduction based on the pre-treatment pain measures.

It was not possible to combine all three studies in a meta-analysis because the study by [Poole 2007](#) examined reflexology on the foot. The meta-analysis of the studies by [Field 2007](#) and [Hernandez-Reif 2001](#) was possible only for outcomes of pain intensity. The weighted mean difference (WMD) of pain intensity in the short-term follow-up for these two studies combined was -1.27 (95% CI: -2.46; -0.08). See [Figure 5](#).

Figure 5.

Author(s): Andrea D Furlan, Marta Imamura, Trish Dryden, Emma Irvin

Date: 2008-08-07

Question: Should massage vs relaxation be used for low-back pain?

Settings:

Bibliography: Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews 2008, Issue 4.

Quality assessment							Summary of findings				Quality	Importance
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	No of patients		Effect			
							massage	relaxation	Relative (95% CI)	Absolute		
Pain intensity - Short-term follow-up (measured with: VITAS¹; range of scores: 0-10; Better indicated by less)												
2	randomised trial	very serious ²	no serious inconsistency	no serious indirectness	no serious imprecision	none	27	27	-	MD -1.27 (-2.46 to -0.08)	⊗⊗⊙⊙	LOW
Pain quality - Short-term follow-up (measured with: SF-McGill Pain Questionnaire³; range of scores: -; Better indicated by less)												
1	randomised trial	serious ²	no serious inconsistency	no serious indirectness	serious ⁴	none	12	12	-	not pooled	⊗⊙⊙⊙	LOW

¹ present pain using VAS

² H-R 2001 = high risk of bias (unsure of concealment, blinding of care provider and outcome assessor, co-interventions, 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).

³ 11 questions

⁴ only one study

2d) Comparison between massage and acupuncture

One study with low risk of bias (172 people; [Cherkin 2001](#)) showed no significant difference in pain in the short-term (ANCOVA, $P = 0.23$), but there was a significant improvement in function (ANCOVA, $P = 0.01$). At 52 weeks, massage was superior to acupuncture in its effect on pain (ANCOVA, $P = 0.002$) and function (ANCOVA, $P = 0.05$). See [Figure 6](#).

Figure 6.

Author(s): Andrea D Furlan, Marta Imamura, Trish Dryden, Emma Irvin

Date: 2008-08-07

Question: Should massage vs acupuncture be used for low-back pain?

Settings:

Bibliography: Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews 2008, Issue 4.

Quality assessment							Summary of findings				Importance	
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	No of patients		Effect			Quality
							massage	acupuncture	Relative (95% CI)	Absolute		
Pain intensity / symptom bothersomeness - Short-term follow-up (follow-up mean 10 weeks; range of scores: 0-10; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	78	94	-	not pooled	⊗⊗⊗○ MODERATE	
Pain intensity / symptom bothersomeness - Long-term follow-up (follow-up mean 52 weeks; range of scores: 0-10; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	78	94	-	not pooled	⊗⊗⊗○ MODERATE	
Function - Short-term follow-up (follow-up mean 10 weeks; 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 ¹	none	78	94	-	not pooled	⊗⊗⊗○ MODERATE	
Function - Long-term follow-up (follow-up mean 52 weeks; 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 ¹	none	78	94	-	not pooled	⊗⊗⊗○ MODERATE	

¹ only one study

2e) Comparison between massage and self-care education

One study with low risk of bias (168 people; [Cherkin 2001](#)) 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. See [Figure 7](#).

Figure 7.

Author(s): Andrea D Furlan, Marta Imamura, Trish Dryden, Emma Irvin
 Date: 2008-08-07
 Question: Should massage vs self-care education be used for low-back pain?
 Settings:
 Bibliography: Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews 2008, Issue 4.

Quality assessment							Summary of findings				Quality	Importance
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	No of patients	self-care education	Relative (95% CI)	Absolute		
Pain intensity / symptom bothersomeness - Short-term follow-up (follow-up mean 10 weeks; range of scores: 0-10; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	78	90	-	not pooled	⊕⊕⊕⊕ MODERATE	
Pain intensity / symptom bothersomeness - Long-term follow-up (follow-up mean 52 weeks; range of scores: -; Better indicated by less)												
1	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious ¹	none	78	90	-	not pooled	⊕⊕⊕⊕ MODERATE	
Function - Short-term follow-up (follow-up mean 10 weeks; 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 ¹	none	78	90	-	not pooled	⊕⊕⊕⊕ MODERATE	
Function - Long-term follow-up (follow-up mean 52 weeks; 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 ¹	none	78	90	-	not pooled	⊕⊕⊕⊕ MODERATE	

¹ only one study

2f) Comparison between acupuncture massage and physiotherapy (including traction, manipulation, thermotherapy, infrared, electrical stimulation and exercise therapy)

The meta-analysis of two studies conducted by the same group, one study with high risk of bias (146 people; Hsieh 2004) and one study with low risk of bias (129 people; Hsieh 2006) showed that acupuncture massage was significantly better than physiotherapy for pain both in the short-term 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, one study with low risk of bias (Hsieh 2006) 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 low-back pain and improving function, measured by a pain visual analogue scale, Roland and Morris Disability Questionnaire and Oswestry Disability Index.

3) 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 with low risk of bias (47 people; Preyde 2000) 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. Massage combined with exercise and education was significantly better than sham laser in the three outcome measures on both short and long-term follow-up. However, massage combined with exercise and education was better than massage alone only on measurements of pain intensity, in the short-term.

One study with low risk of bias (190 people; Franke 2000) 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 to 100%) and 0.8 cm (10-mm VAS).

One study with high risk of bias (100 people; Geisser 2005a; Geisser 2005b) showed that massage therapy combined with specific adjuvant exercises appears to be beneficial in treating chronic low-back pain in short-term follow-up. Despite changes in pain, perceived function did not improve.

One study with low risk of bias (122 people; Poole 2007) showed that the addition of reflexology to usual general practitioners' care was not better than usual care alone (for 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 pre-treatment scores.

One study with high risk of bias (61 people; [Yip 2004](#)) 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 one week after the end of treatment ($P = 0.0001$). There was no significant difference in measures of daily activities between the two groups.

4) Different techniques of massage

One study with low risk of bias (190 people; [Franke 2000](#)) compared acupuncture massage to classical (Swedish) massage. Each massage therapy group also received one of two types of exercise programs (individual or in group). This study showed that acupuncture massage was superior to classical massage (irrespective of the type of exercise received) on measures of both pain and function, but this needs confirmation in other studies.

One study with low risk of bias (180 people; [Chatchawan 2005](#)) 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 two groups at the end of three weeks. The difference between groups was 0.2, (95% CI: -0.4 to 0.7) or at the evaluation one month later the difference between groups was 0.2 (95% CI: -0.8 to 0.4). Both traditional Thai massage (decrease of 3.3 in the VAS scores, 95% CI 2.8 to 3.7) and Swedish massage (decrease of 3.2 in the VAS scores, 95% CI 2.8 to 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 ([Cherkin 2001](#); [Hernandez-Reif 2001](#); [Preyde 2000](#)).

Costs

In one study ([Preyde 2000](#)), the cost of six 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 ([Cherkin 2001](#)), 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, (one study with low risk of bias with 129 people ([Hsieh 2006](#)) and one study with high risk of bias with 61 people ([Yip 2004](#))) 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 ([Hsieh 2006](#)). Electrical stimulation on acupuncture points followed by acupressure with aromatic lavender oil had no significant effects on housework, work or leisure time ([Yip 2004](#)). 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 ([Field 2007](#)).

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 post-massage soreness and ecchymosis. In one study with low risk of bias ([Chatchawan 2005](#)), 19 participants (11%) reported temporary (10 to 15 minutes) soreness after treatment on day one and 22 (12%) after treatment in week three. In another study with low risk of bias ([Cherkin 2001](#)), 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 five people (6%) ([Chatchawan 2005](#)). No direct adverse effects were reported in the group receiving acupressure ([Hsieh 2004](#)). In the study by [Yip 2004](#), there were also no adverse events observed.

DISCUSSION

We updated our previous review ([Furlan 2002](#)) with nine recently published randomized controlled trials. Our conclusions do not differ from our previous review. Our findings suggest that massage might be beneficial for patients with subacute and chronic non-specific low-back pain, especially if combined with exercise and delivered by a licensed therapist. The studies suggest that massage has long-lasting effects (at least one 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. [Preyde 2000](#) employed a sham treatment that controlled for the interper-

sonal contact and support. [Farasyn 2006](#) 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 adequacy and relevance of the massage therapy delivered in the studies. The methodological quality assessment was done by two 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 ([van Tulder 2003](#)). 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.

AUTHORS' CONCLUSIONS

Implications for practice

Massage is beneficial for patients with subacute and chronic non-specific low-back pain 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 one 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 ([Ezzo 2007](#)). Because most outcomes in low-back pain are subjective measures, the ideal control group is

one that ensures that treatments are equally credible and acceptable to patients to minimize placebo effects and high dropout rates ([Haraldsoon 2006](#)). 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 two (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 include long-term follow-up. Authors are encouraged to follow the CONSORT statement for reporting their trials ([Moher 2001](#)) and use the standard outcomes for trials of LBP as described by Deyo ([Deyo 1998](#)), 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.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Chatchawan 2005

Methods	<p>Country: Thailand</p> <p>Funding: study grant from the Office of the Higher Education Commission, Ministry of Education, Thailand.</p> <p>Blinding: outcome assessor</p> <p>Recruited: 214</p> <p>Randomized: 180</p> <p>Followed: 177 at post treatment; 172 at one month</p> <p>Analyses: Paired t-tests for comparisons immediately before and after treatment and follow-ups. ANCOVA for comparisons between groups.</p> <p>Intention-to-treat analysis: "yes" as stated by authors, but "no" because not all randomized patients were analyzed</p> <p>Quality score: 8/11</p>
Participants	<p>Population: Back pain associated with myofascial trigger points</p> <p>Settings: Department of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University, Thailand.</p> <p>Mean age: 36.4 years</p> <p>% female: 114 (63%)</p> <p>% White: not reported</p> <p>Work status: heavy work: N = 9 (5%); lighter work: N = 171 (95%)</p> <p>Pain duration: 35.7 months</p> <p>Previous surgery: not included in the study if back surgery</p> <p>Diagnoses: presence of at least one trigger point diagnosed as the presence of local tenderness at a palpable nodule in a taut band and with pain recognition</p>
Interventions	<p>Massage technique: Traditional Thai massage (TTM) along two lines on each side of the back: approximately one finger breadth away from the spinous process from 2 cm above the posterior superior iliac spine to C7; about two finger breadths away from the spinous process at the same course. One single massage point on each side of the back three finger breadths away from the spinous process of L2; employed 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 five to ten seconds at a time, for 30 minutes, 10 minutes passive stretching during for six sessions over a period of three to four weeks.</p> <p>Experience of therapist: four, eight and 20 years of experience</p> <p>Group 1: Traditional Thai Massage - TTM (90 randomized to this group)</p> <p>Group 2: Swedish massage - SM (90 randomized to this group)</p>
Outcomes	<p>Measured at baseline, immediately after first treatment; during intervention period (three weeks) and one month after last treatment</p> <p>a. Pain: VAS</p> <p>b. Overall improvement: not measured</p> <p>c. Function: Thai version of the Oswestry disability questionnaire (ODQ);</p>

Chatchawan 2005 (Continued)

	<p>d. Patient satisfaction: 4 point scale (1 = completely dissatisfied to 4 = very satisfied); % of very satisfied</p> <p>e. Pressure pain threshold (PPT) algometry; Thoracolumbar ROM, body flexibility (sit-and-reach box)</p> <p>f. Adverse events: soreness, allergic reaction (rashes and pimples) to the massage oil</p> <p>g. Costs: not reported</p> <p>h. Work-related: not measured</p>
Notes	<p>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</p> <p>b) Function: ODQ (baseline, 3 weeks and 1 month FU): Group 1: from 20.7 to 13.8 to 13.4 Group 2: from 20.7 to 15.4 to 13.9</p> <p>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</p> <p>d) patient satisfaction: Group 1: 83% day 1; 88% week 3 Group 2: 86% day 1; 82% week 3</p> <p>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."</p> <p>Review author's comments: Comparison between two massage techniques (no inactive control group); patients could be blinded to which technique they were receiving;</p>

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	
Allocation concealment?	Yes	A - Adequate
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	

Chatchawan 2005 (Continued)

Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	
Similarity of baseline characteristics?	Yes	
Co-interventions avoided or similar?	Yes	
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Cherkin 2001

Methods	<p>Country: USA</p> <p>Method of randomization: computer-generated random sequence.</p> <p>3996 letters were mailed. 693 consent forms returned. The first 262 enrollees confirmed eligible were randomized.</p> <p>Outcome assessors were blinded. Patients were HMO enrollees, six weeks after a primary care visit for back pain.</p> <p>Period of study: May-Oct 1997.</p> <p>Intention-to-treat analysis.</p> <p>Follow-up: four, 10 and 52 weeks after randomization.</p> <p>95% were followed up to 52 weeks.</p> <p>Quality score: 8 / 11</p>
Participants	<p>Settings: This study was conducted at Group Health Cooperative, a large staff-model health maintenance organization (HMO) in Washington State</p> <p>Average age: 44.9 years. 58% women. 84% white. 84% employed or self-employed.</p> <p>Previous treatments: 6% operation, 3% acupuncture, 16% massage</p> <p>Length of pain: at least six weeks, 61% lasted more than one year</p>
Interventions	<p>(1) Licensed therapist. At least three years of experience.</p> <p>Manipulation of soft tissue (i.e. muscle and fascia).</p> <p>Swedish (71%), movement reeducation (70%), deep-tissue (65%), neuromuscular (45%), and trigger and pressure point (48%), Moist heat or cold (51%).</p> <p>Prohibited: energy techniques (Reiki, therapeutic touch).</p> <p>Proscribed meridian therapies (acupressure and shiatsu) and approaches deemed too specialized (craniosacral and Rolfing)</p> <p>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.</p> <p>Mean (SD) number of visits= 8.0 (2.4).</p> <p>(2) Traditional Chinese medical acupuncture.</p> <p>Mean (SD) number of visits= 8.3 (2.3).</p> <p>(3) Self-care education: high-quality and inexpensive educational material designed for persons with chronic back pain: a book and two professionally produced videotapes</p>

Cherkin 2001 (Continued)

Outcomes	<p>Measured before, after four, 10 and 52 weeks of the randomization</p> <p>Primary outcome measures:</p> <ul style="list-style-type: none"> 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 three) score was used. (valid) b. Modified Roland Disability Scale (reliable, valid and sensitive) <p>Secondary outcome measures:</p> <ul style="list-style-type: none"> 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. Number of days of exercise i. Work-related outcomes: not measured
Notes	Authors' conclusions: therapeutic massage was effective for persistent low-back pain, apparently providing long-lasting benefits

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	
Allocation concealment?	Yes	A - Adequate
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	Unclear	Unclear from text
Blinding? All outcomes - outcome assessor?	Yes	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	
Similarity of baseline characteristics?	Yes	
Co-interventions avoided or similar?	Yes	
Compliance acceptable?	Yes	

Cherkin 2001 (Continued)

Timing outcome assessments similar?	Yes	
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Farasyn 2006

Methods	<p>Country: Belgium Funding: not reported Blinding: outcome assessor for PPT measurement Recruited: 170 Randomized: 60 Followed: 60 Analyses: Baseline: ANOVA for continuous variables and chi-square for categorical variables, including post-hoc comparisons with LSD-tests. ODI and VAS scores were analyzed by Wilcoxon-tests. Intention-to-treat analysis: yes Quality score: 4 / 11</p>
Participants	<p>Mean age: 43 in placebo group, 41 in treatment group and 40 in control group % female: 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: > three weeks and < 12 weeks Previous surgery: not reported Diagnoses: non specific low-back pain</p>
Interventions	<p>Massage technique: Roptrotherapy: 30-minute deep cross-friction massage with the aid of a myofascial T-bar made of bronze (neutral material to skin) to use by hand and 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/cm². One session. Experience of therapist: not reported Endermology (placebo): 30-minute session of endermology to account for the touching effects of massage, a device with a suction head was 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)</p>
Outcomes	<p>When measured: one week after session a) Pain: Pressure pain threshold Pain VAS in mm (before and one week 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</p>

Farasyn 2006 (Continued)

	h) Work-related: no	
Notes	<p>Results</p> <p>a) Pain (VAS)</p> <p>Group 1: from 56 to 37</p> <p>Group 2: from 57 to 59</p> <p>Group 3: from 49 to 52</p> <p>b) Function (Oswestry)</p> <p>Group 1: from 34 to 16</p> <p>Group 2: from 36 to 38</p> <p>Group 3: from 29 to 31</p> <p>Author's conclusions: "The results of this study provide direct evidence that one 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."</p> <p>Review author's comments: Lack of blinding, poor description of methods of randomization</p>	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Unclear from text
Allocation concealment?	Unclear	D - Not used
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	
Similarity of baseline characteristics?	No	
Co-interventions avoided or similar?	Unclear	Unclear from text
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Field 2007

Methods	Country: USA Method of randomization: not described Methods of recruitment: not described Funding: National Institute of Mental Health Research Scientist Award and Research Grant Blinding: not blinded Recruited: not described Randomized: 30 Followed: not described Analyses: repeated measures ANOVA Quality score: 1/ 11
Participants	Mean age: 41 16 male, 14 female 67% Caucasian, 9% Hispanic, 16% African American, 8% Asian Work status: not reported Pain duration: at least six months Previous surgery: not reported Diagnoses: chronic low-back pain co-morbidity: not reported
Interventions	Massage to the entire back, legs and knees, using a Biotone oil, two 30 minute sessions per week for five weeks Experience of therapist: not reported Groups: 1. Two 30-min massage therapy sessions per week over five weeks (total 10 sessions) by trained massage therapist who used Biotone Spa Replenishing Light Body Oil each session starting with the participants in the prone position, resting the ankles on a small cushion. Massage consisted of the following techniques 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. (number of people randomized was not described) 2. Relaxation therapy (number of people randomized was not described): A relaxation therapy group, which was included to control for potential placebo and increased attention effects, was shown how to use 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

Field 2007 (Continued)

	30-min sessions at home twice a week for five weeks and to keep a log on the times they spent in relaxation therapy	
Outcomes	<p>When measured: pre and post last day (immediately after the end of the 10 sessions)</p> <p>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</p>	
Notes	<p>Results:</p> <p>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</p>	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Unclear from text
Allocation concealment?	Unclear	D - Not used
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Unclear	Unclear from text
Incomplete outcome data addressed? All outcomes - ITT analysis?	Unclear	Unclear from text
Similarity of baseline characteristics?	Unclear	Unclear from text
Co-interventions avoided or similar?	Unclear	Unclear from text
Compliance acceptable?	Unclear	Unclear from text

Field 2007 (Continued)

Timing outcome assessments similar?	Yes
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Franke 2000

Methods	<p>Country: Germany</p> <p>Method of randomization: random numbers table, closed envelopes. Design: 2x2 factorial design.</p> <p>190 patients were randomized.</p> <p>Methods of recruitment not mentioned.</p> <p>Period of study: 14 months, until the end of 1997.</p> <p>No intention-to-treat analysis.</p> <p>All medications needed to be discontinued before the beginning of the study protocol.</p> <p>Follow-up: until end of sessions.</p> <p>Drop-outs: 11 patients (5.8%).</p> <p>Quality score: 5 / 11</p>
Participants	<p>Settings: Study conducted in Bad Andersheim City, Park Rehabilitation Clinic</p> <p>Duration of pain: more than one year. Participants needed to speak German to be included. Age: 25-55 years (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</p>
Interventions	<p>(1) Acupuncture massage according to Penzel: follow the rules of massage from Physical Medicine and of acupuncture from neural therapy according to Huneke and Quirotherapy Uses a manual metal roller for meridians treatment. Treats one unique point with a special vibrating instrument that stimulates the acupuncture point superficially (not needle insertion)</p> <p>(2) Teil massage (classic massage). The objective is to tonify and defonify muscle structures by increasing circulation in the skin and muscle, decrease adhesions.</p> <p>(3) Individual Exercises:</p> <ol style="list-style-type: none"> 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. <p>(4) Group exercises same as individual exercises, but in group mode</p> <p>Study groups:</p> <ul style="list-style-type: none"> (1) + (3) (1) + (4) (2) + (3) (2) + (4)

Franke 2000 (Continued)

Outcomes	<p>Measured before and after the sessions.</p> <p>a. Pain: VAS (1 to 10cm)</p> <p>b. Overall improvement: not measured</p> <p>c. Function: Hanover Function Score Questionnaire for low-back pain (FFbH-R) 0 - 100%</p> <p>d. Physical examination: lumbar flexion and extension (degrees)</p> <p>e. adverse events: not reported</p> <p>f. Costs: not reported</p> <p>g. Work-related outcomes: not measured</p>	
Notes	<p>Authors' conclusions: the observed effect sizes with acupuncture massage are promising and warrant further investigation in replication studies.</p> <p>Acupuncture massage showed beneficial effects for both disability and pain compared with Swedish massage.</p> <p>Marked improvement observed in Acupuncture massage + group exercise. Acupuncture massage improved function (with individual or group exercises). Classic massage did not change function.</p> <p>Most decrease in pain occurred in the acupuncture massage + individual exercise group. Acupuncture massage (with individual or group exercise) reduced pain.</p> <p>Mean difference between acupuncture and classic massage groups: 7.0% (function) and 0.8cm (VAS)</p> <p>ANOVAS:</p> <p>Acupuncture massage is more effective than Swedish massage for function (P = 0.008) and for pain (P = 0.038)</p> <p>Both exercises groups (individual or in group) are not statistically significantly different for function (P = 0.55) or for pain (P = 0.55)</p>	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Adequate sequence generation?	Yes	
Allocation concealment?	Yes	A - Adequate
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	

Franke 2000 (Continued)

Incomplete outcome data addressed? All outcomes - ITT analysis?	No	
Similarity of baseline characteristics?	No	
Co-interventions avoided or similar?	Yes	
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Geisser 2005a

Methods	<p>Country: USA Funding: National Institute of Health Blinding: outcome assessor Recruited: 100 patients Randomized: 100 patients Followed: 72 patients Analyses: MANOVA and MANCOVA for comparisons between groups Included in the analysis only the 72 patients who completed the study (no intention-to-treat analysis) Quality score: 5 / 11</p>
Participants	<p>Settings: University of Michigan Spine Program Mean age: 40.7 years old 41% female 85% White 34% not working due to pain Pain duration: mean 76.9 months 18% had previous surgery Diagnoses: not reported</p>
Interventions	<p>Massage: muscle energy technique (MET) weekly for five weeks Experience of therapists: physical therapist with 12 years postgraduate training in manual medicine Group 1: massage + specific exercises (N = 26 randomized to this group) Group 2: massage + nonspecific exercises (N = 24) Group 3: sham massage + specific exercises (N = 25) Group 4: sham massage + nonspecific exercises (N = 25)</p>
Outcomes	<p>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: four questions with seven-point Likert scale f. Adverse events: not measured</p>

Geisser 2005a (Continued)

	g. Costs: not reported h. Work-related: not measured
Notes	<p>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</p> <p>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</p> <p>d) Satisfaction with overall therapy: Group 1: 6.3 Group 2: 6.0 Group 3: 5.1 Group 4: 5.9</p> <p>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"</p> <p>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?)</p>

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Unclear from text
Allocation concealment?	Unclear	B - Unclear
Blinding? All outcomes - patients?	Yes	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	Yes	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	No	
Similarity of baseline characteristics?	No	

Geisser 2005a (Continued)

Co-interventions avoided or similar?	Unclear	Unclear from text
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Geisser 2005b

Methods	
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	D - Unclear

Hernandez-Reif 2001

Methods	Country: USA Method of randomization: not described. 24 were randomized. Blindedness 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
Participants	Settings: not described Average age: 39.6 years. 54.1% women. 67% Caucasians, 8% Hispanic, 17% African American and 8% Asian. Duration of pain: at least six months. Previous treatments: not described
Interventions	(1) 30-minute massage therapy sessions per week over five weeks 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

	<p>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.</p> <p>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.</p> <p>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.</p> <p>(2) Relaxation therapy: (to control for potential placebo effects and the effects of increased attention given to the massage subjects):</p> <p>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-minute session at home twice a week for five weeks and to keep a log</p>	
<p>Outcomes</p>	<p>Measured before and after each session.</p> <p>Pain measures:</p> <ol style="list-style-type: none"> Short-form McGill Pain Questionnaire (SF-MPQ): 11 questions based on sensory dimensions and 4 questions based on affective dimensions VITAS: present pain with a VAS ranging from 0 to 10. Stress measures: Profile of Mood States Depression Scales (POMS-D): five-point scale ranging from “not at all” to “extremely”. Adequate concurrent validity and good internal consistency. Adequate measure of intervention effects 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 Range of Motion (ROM): trunk flexion = C7-L1 Pain flexion ROM measure (touch toes with pain). adverse events: not reported Costs: not reported Work-related outcomes: not measured 	
<p>Notes</p>	<p>Authors’ conclusions: massage therapy is effective in reducing pain, stress hormones and symptoms associated with chronic low-back pain</p>	
<p>Risk of bias</p>		
<p>Item</p>	<p>Authors’ judgement</p>	<p>Description</p>
<p>Adequate sequence generation?</p>	<p>Yes</p>	
<p>Allocation concealment?</p>	<p>Unclear</p>	<p>B - Unclear</p>
<p>Blinding? All outcomes - patients?</p>	<p>No</p>	

Hernandez-Reif 2001 (Continued)

Blinding? All outcomes - providers?	Unclear	Unclear from text
Blinding? All outcomes - outcome assessor?	Unclear	Unclear from text
Incomplete outcome data addressed? All outcomes - drop-outs?	No	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Unclear	Unclear from text
Similarity of baseline characteristics?	Yes	
Co-interventions avoided or similar?	Unclear	Unclear from text
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Hsieh 2004

Methods	<p>Country: Taipei, Taiwan, China Funding: not reported Blinding: outcome assessor, however pain is subjective and patient was not blinded Recruited: 250 Randomized: 146 Followed: post treatment = 146; at six months = 121 Analyses: independent t-test for continuous variables; chi-square test for categorical variables; Wilcoxon ranksum test for comparisons between the two treatment groups; Wilcoxon sign-rank test for changes before and after treatment Intention-to-treat analysis: yes immediately after treatment, no at six-month follow-up Quality score: 5 or 6 / 11</p>
Participants	<p>Settings: regional orthopedic hospital in the Kaoshiung, Taiwan area, which offers routine orthopedic operation and rehabilitation of physical therapy Mean age: Mean age: Acupressure group: 47.6; Physical therapy (control) group: 47.6 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</p>

Hsieh 2004 (Continued)

	<p>Pain duration: 67% of patients over 6 months (range one month to over 10 years) Previous surgery: not reported Diagnoses: not detailed</p>	
Interventions	<p>Massage technique: six acupressure sessions over a four-week period, lasting approximately 15 minutes (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 Groups: Group 1: acupressure (N = 69 randomized to this group) 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)</p>	
Outcomes	<p>Measured at baseline, then immediately after 6 sessions of treatment, and at the six-month follow-up</p> <p>a. Pain: - Pain visual scale (0-5), - 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 zero (none) to three (severe). Summation of these 15 intensity scale numbers yielded a pain score for each patient (range 0 - 45)</p> <p>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</p>	
Notes	<p>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</p> <p>a) SF-PQ: pain descriptors: significant difference between groups post treatment: throbbing, shooting, stabbing, sharp, cramping, aching, sickening, punishing-cruel; at 6 month FU: cramping, aching, tiring-exhausting</p> <p>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."</p> <p>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</p>	
Risk of bias		
Item	Authors' judgement	Description

Hsieh 2004 (Continued)

Adequate sequence generation?	Yes	
Allocation concealment?	Yes	A - Adequate
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	Note: "yes" immediately after treatment, "no" at 6 months follow-up
Similarity of baseline characteristics?	No	
Co-interventions avoided or similar?	Unclear	Unclear from text
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Hsieh 2006

Methods	<p>Country: Taiwan, China Funding: None Blinding: Outcome assessor Recruited: 188 Randomized: 129 Followed: 122 at one month; 109 at six months Analyses: For comparisons between groups: 1) Wilcoxon rank sum test (Roland and Morris), jack-knife method to calculate 95% confidence intervals. 2) ANCOVA for VAS and Oswestry, adjusted for pretreatment score alone or together with other possible baseline variables such as duration of low-back pain; 3) logistic regression to estimate the odds ratio of having significant disability as measured by Roland and Morris; 4) cumulative logit models to the ordinal property of disability defined by Oswestry. Intention-to-treat analysis: yes, for participants lost to follow-up, baseline values were assumed at post-treatment and six month follow-up. All 129 randomized patients were analyzed. Quality score: 7 / 11</p>
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Hsieh 2006 (Continued)

Participants	<p>Settings: outpatients of a specialist orthopaedic clinic in Kaoshiung, Taiwan, which offered standardised physical therapy</p> <p>Mean age: 50.2 in the acupressure group; 52.6 in the physical therapy group</p> <p>Gender: 41% female</p> <p>Ethnicity: not reported, (assume all Chinese)</p> <p>Work status: N (%) acupressure vs PT</p> <p>Household keeper 18 (28) vs 16 (25)</p> <p>Office worker 17 (27) vs 8 (12)</p> <p>Heavier labour 9 (14) vs 8 (12)</p> <p>Other 20 (31) vs 33 (51)</p> <p>Pain duration: median (range) time since onset of pain (years): acupressure group: 3.3 (0.2-33.3) vs physical therapy group: 1.6 (0.2-34.3)</p> <p>Median (range) length of latest pain period (months): acupressure group: 14.5 (0.02-360) vs physical therapy group: 12 (0.25-432)</p> <p>Previous surgery: none (inclusion criteria)</p> <p>Diagnoses: chronic low-back pain over four months by orthopaedic surgeon</p>
Interventions	<p>Massage technique: acupressure six sessions within a month</p> <p>Experience of therapist: one senior acupressure therapist delivered each session to ensure a consistent experience. No detail on time of experience</p> <p>Group 1: acupressure (N = 64 randomized to this group)</p> <p>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)</p>
Outcomes	<p>Measured at baseline, after six sessions of treatment and at six months FU</p> <p>a. Pain: VAS (01-100)</p> <p>b. Function: 1. Roland and Morris disability questionnaire (primary outcome) (range: 0 - 24); 2. modified Oswestry disability questionnaire</p> <p>c. Overall improvement: Chinese version of the standard core outcome measures (degree of how bothersome)</p> <p>d. Patient satisfaction: as part of the core outcome measures: satisfaction of life with symptoms; satisfaction with previous treatment</p> <p>f. Adverse events: not reported</p> <p>g. Costs: not reported</p> <p>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</p>
Notes	<p>a) Pain (100-mm VAS)</p> <p>Group 1: from 58.8 to 30.6 to 16.1</p> <p>Group 2: from 57.0 to 48.0 to 41.4</p> <p>b1) Function (Roland and Morris)</p> <p>Group 1: from 10.9 to 5.4 to 2.2</p> <p>Group 2: from 10.0 to 9.2 to 6.7</p> <p>b2) Function (Oswestry)</p> <p>Group 1: from 24.4 to 17.0 to 12.2</p> <p>Group 2: from 21.1 to 20.6 to 17.9</p> <p>d) satisfaction of life with symptoms:</p>

Hsieh 2006 (Continued)

	<p>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 six months</p>
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Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	
Allocation concealment?	Yes	A - Adequate
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	
Similarity of baseline characteristics?	Yes	
Co-interventions avoided or similar?	Unclear	Unclear from text
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Mackawan 2007

Methods	Country: Thailand Funding: 2002-2003 Khon Kaen University research grant, Khon Kaen University, Khon Kaen, Thailand. Blinding: not reported Recruited: not reported Randomized: 67 Followed: 67 Analyses: Ancova to compare the difference between groups. Intention-to-treat analysis: yes Quality score: 7 / 11
Participants	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: TTM: 5 Mob: 3 Pain duration: >12 weeks Previous surgery: excluded from study Diagnoses: non specific low-back pain
Interventions	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) One session of 10 minute 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. One session of 10 minute duration
Outcomes	Measured: immediately after a) Pain: VAS (before and five minutes after the treatment) b) Function: no c) Overall improvement: no d) Patient satisfaction: no f) Adverse events: not reported g) Costs: not reported

Mackawan 2007 (Continued)

	h) Work-related: no i) Saliva substance P level (before and 5 minutes after the treatment)	
Notes	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-mediations, previous use of TTM or mobilization, prior beliefs, co-morbidity, duration of pain episode, previous treatments	
Risk of bias		
Item	Authors' judgement	Description
Adequate sequence generation?	Yes	
Allocation concealment?	Unclear	D - Not used
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	Yes	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	
Similarity of baseline characteristics?	Unclear	Unclear from text
Co-interventions avoided or similar?	Unclear	Unclear from text
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Poole 2007

Methods	Country: England Method of randomization: minimization technique. Outcome assessor not blinded. Patients were recruited from primary care sources. Recruited: 650 letters sent by 12 GPs - 278 replies Randomized: 243 Follow-up: 191 at baseline (78%); 165 at end of six sessions (68%); 156 at six months (64% of 243). Intention-to-treat analysis: no. Analyses: Repeated measures ANCOVA. Quality score: 3 / 11
Participants	Setting: Private clinic 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 (months): Reflexology: 120.6 Relaxation: 128 No intervention: 114.7 Co-morbidity: not described
Interventions	Massage technique: foot reflexology - Morrell technique (application of firm but gentle compression to the feet) No standardized protocol provided six sessions of approximately one hour duration over a period of six to eight weeks. 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)
Outcomes	Measured at: baseline, after the end of all sessions, at six months 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

Poole 2007 (Continued)

Notes	<p>Results:</p> <p>SF-36 Pain - Mean (SD):</p> <p>Group 1: from 38.4 (22.9) to 50.0 (25.7) to 50.7 (27.1)</p> <p>Group 2: from 43.8 (23.3) to 47.2 (26.3) to 48.8 (25.9)</p> <p>Group 3: from 37.5 (20.3) to 41.8 (25.6) to 44.4 (28.5)</p> <p>VAS</p> <p>Group 1: from 44.5 (24.8) to 35.0 (25.9) to 39.8 (29.2)</p> <p>Group 2: from 40.7 (28.6) to 37.9 (27.0) to 41.3(28.5)</p> <p>Group 3: from 40.6 (26.7) to 48.9 (29.3) to 42.7 (28.4)</p> <p>Author's conclusions:</p> <p>"The current study does not indicate that adding reflexology to usual care for the management of CLBP is any effective than usual care alone."</p>
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Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Minimization technique
Allocation concealment?	Unclear	D - Not used
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	No	
Similarity of baseline characteristics?	Unclear	Unclear from text
Co-interventions avoided or similar?	No	
Compliance acceptable?	Unclear	Unclear from text
Timing outcome assessments similar?	Yes	

Preyde 2000

Methods	<p>Country: Canada</p> <p>Method of randomization: random numbers table.</p> <p>165 patients were recruited, 107 met the inclusion criteria and 104 were randomized.</p> <p>92% were followed.</p> <p>Outcome assessor of range of motion was blinded.</p> <p>Patients were recruited by university e-mails, flyers sent to family physicians and advertisements in the local newspapers in Ontario</p> <p>Period of study: 1998-1999.</p> <p>Follow-up: one month after end of treatment. Intention-to-treat analysis</p> <p>Quality score: 8 / 11</p>
Participants	<p>Settings: This study was conducted at the Health and Performance Centre, University of Guelph, Guelph, Ont., which offers multidisciplinary services such as sports medicine, physiotherapy and chiropractic manipulation</p> <p>Average age: 46 years. 51% female. Average duration of pain: three months (one week to eight months).</p> <p>Previous treatments not described.</p>
Interventions	<p>(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 minutes.</p> <p>Stretching exercises for the trunk, hips and thighs, including flexion and modified extension. Stretches were to be within a pain-free range, held on one occasion per day for the related areas and more frequently for the affected areas.</p> <p>15 to 20 minutes of education on posture and body mechanics, particularly as they related to work and daily activities.</p> <p>(2) Soft-tissue manipulation only (STM). This group received the same soft-tissue manipulation as the subjects in the CMT group.</p> <p>(3) Remedial exercise only (RE). This group received the same exercise and education sessions as subjects in the CMT group.</p> <p>(4) The control group received 20 minutes 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</p>
Outcomes	<p>Measured at baseline, at the end of the treatment and at one month follow-up</p> <p>a. Present Pain Index: PPI score (valid, reliable)</p> <p>b. Pain Rating Index: PRI score (valid, reliable)</p> <p>c. Roland Disability Questionnaire: RDQ score (valid, reliable, sensible)</p> <p>d. State Anxiety Index Score (reliable, valid, internal consistent)</p> <p>e. Modified Schoeber test</p> <p>f. Adverse events: not reported</p> <p>g. Costs</p> <p>h. Work-related outcomes: not measured</p>
Notes	<p>Authors' conclusions: massage is beneficial for patients with subacute low-back pain</p> <p>Measured at the end of all sessions and one month after the end of sessions</p>

Preyde 2000 (Continued)

Risk of bias		
Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Random numbers table
Allocation concealment?	Yes	A - Adequate
Blinding? All outcomes - patients?	Unclear	Unclear from text
Blinding? All outcomes - providers?	Unclear	Unclear from text
Blinding? All outcomes - outcome assessor?	Yes	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	
Similarity of baseline characteristics?	Yes	
Co-interventions avoided or similar?	Yes	
Compliance acceptable?	Yes	
Timing outcome assessments similar?	Yes	

Yip 2004

Methods	<p>Country: Hong Kong, China Funding: Partial support of the School of Nursing, Departmental Research Committee for this study. Blinding: not blinded Recruited: 61 Randomized: 61 Followed: 51 (84%) Analyses: Mean ratio change = X_2/X_1, where X_2 was the mean score at post one-week follow-up, X_1 was the mean score at baseline, comparison between groups by Mann-Whitney U test Intention-to-treat analysis: No Quality score: 5 / 11</p>
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<p>Participants</p>	<p>Settings: The research was carried out among members of the community centre, Old-Aged Home and Women Workers Association, recruited via notices on bulletin boards Mean age: 45.81 years % female: 97% Ethnicity: not reported, but assume all Chinese Work status: not reported Pain duration: of current episode: Group 1: 39.16 hours Group 2: 51.45 hours Previous surgery: not reported Diagnoses: non specific sub-acute LBP defined as pain on most days in the past four weeks, in the area between the lower coastal margins and the gluteal folds without known specific cause, such as a spinal deformity</p>
<p>Interventions</p>	<p>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 eight (4 bilateral) fixed acupoints for two minutes each: San-Jiao-Shu (UB22), Shen-Shu (UB23), Da-Chang-Shu (UB25) and Wei-Zhong (UB40); for 35-40 minutes, eight times over a three-week period Before massage: 10 minutes 'relaxation' with a digital Electronic Muscle Stimulator (7.69 Hz at 0.05 mA) delivered by five pairs of medium sized (2.5 cm) electrode pads on five bilateral acupoints [Shou-San-Li (LI10), Qu-Chi (LI11), Nao-Shu (SI10), Tian-Liao (TW15) and Tian-Zhu (BL10)] Experience of therapist: nurse trained in Chinese Medicinal Nursing. The precision of the acupressure was confirmed by deqi Group 1: acupressure massage (N = 32 randomized to this group) Group 2: usual care only (not described in detail) (N = 29)</p>
<p>Outcomes</p>	<p>Measured at baseline and one week 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 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</p>
<p>Notes</p>	<p>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)</p>

Yip 2004 (Continued)

	<p>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 Author's conclusions: "Our results show that eight-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 sub-acute 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</p>	
Risk of bias		
Item	Authors' judgement	Description
Adequate sequence generation?	Yes	
Allocation concealment?	Unclear	B - Unclear
Blinding? All outcomes - patients?	No	
Blinding? All outcomes - providers?	No	
Blinding? All outcomes - outcome assessor?	No	
Incomplete outcome data addressed? All outcomes - drop-outs?	Yes	
Incomplete outcome data addressed? All outcomes - ITT analysis?	Yes	
Similarity of baseline characteristics?	Yes	
Co-interventions avoided or similar?	Unclear	Co-interventions not described
Compliance acceptable?	Unclear	Unclear from text
Timing outcome assessments similar?	Yes	

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Dishman 2001	This randomized controlled trial was excluded because the population consisted of asymptomatic volunteers. They were randomized to either a spinal manipulation, massage or control group. The purpose of the study was to compare the magnitude and duration of motoneuron inhibition occurring as a sequel to spinal manipulation or paraspinal and limb massage
Farasyn 2007	This is a randomized trial of roptrotherapy versus placebo on 65 patients with subacute low-back pain. Even though they measure pain-VAS and Oswestry disability, the only outcome reported is pressure pain threshold (PPT). We excluded this trial because PPT is not considered a primary outcome in our systematic review. The placebo group also received roptrotherapy after the second week
Ferrell 1997	This randomized controlled trial investigated a mixed population with chronic musculoskeletal pain including low-back pain. Patients were randomly assigned to one of three groups: 1) supervised program of walking, 2) pain education program: heat, cold, massage, relaxation and distraction and 3) usual care. It is excluded from this review because of a mixture of patients and because the effects of massage could not be extracted separately
Fraser 1993	This randomized controlled trial was designed to measure the effects of back massage on anxiety levels of elderly residents in a long-term care facility. It is excluded from this review because massage is not applied to treat low-back pain
Ginsberg 1987	This double-blinded placebo controlled trial was designed to test the effects of Rado-Salil ointment in mechanical low-back pain compared to placebo. Massage was employed in both groups (Rado-Salil and placebo)
Godfrey 1984	This randomized trial was included in the two previous versions of this systematic review (Furlan 2000 and Furlan 2002). However, we decided to exclude this trial in this update because it uses massage as a control group for another active intervention, and therefore massage therapy was not delivered appropriately as it is in practice
Hoehler 1981	This randomized trial was included in the two previous versions of this systematic review (Furlan 2000 and Furlan 2002). However, we decided to exclude this trial in this update because it uses massage as a control group for another active intervention, and therefore massage therapy was not delivered appropriately as it is in practice
Kalaoukalani 2001	This article is a subanalysis of the data derived from the RCT published by Cherkin et al (which is included in this review). The study by Kalaoukalani does not have information about the effects of the interventions. The objective of this subanalysis was to evaluate the association of a patient's expectation for benefit from a specific treatment with improved functional outcome
Kankaanpaa 1999	This is a randomized controlled trial of 59 patients with chronic non-specific low-back pain. The main intervention was "active rehabilitation" consisting of exercises, behavioral support and ergonomic advice. The control group received massage plus thermal therapy, once a week (four treatment sessions). The authors stated that the control group was considered a placebo treatment because massage and thermal therapy are assumed to be ineffective in the treatment for low-back pain. This trial was excluded from this review because 1) the effects of massage could not be distinguished from the effects of thermal therapy and 2) massage was seen as placebo therefore it was applied with no intention to relieve the patient's symptoms

(Continued)

Koes 1993	This is a randomized clinical trial of 256 patients with non-specific back and neck complaints. Patients were given three types of management: physiotherapy (exercises, massage, physical modalities), manual therapy (manipulation or mobilization) and care delivered by general practitioner (drugs: analgesics, advices about posture, home exercise and bed rest). A fourth group received placebo treatment consisting of detuned shortwave and detuned ultrasound. This trial is excluded from this review because the population consists of a mixture of back and neck complaints, and because the effects of massage therapy could not be extracted separately from the other interventions
Kolich 2000	This randomized trial was designed to determine the effects of a massaging lumbar support system on low-back muscle activity. It was excluded because the population consisted of healthy subjects
Konrad 1992	Intervention was underwater massage, which consisted of massage and movement while a stream of hot water (37°C), 1atm, 10 cm) was applied to the affected part. In this case it is difficult to know if the therapeutic effect was due to the massage, the water relaxation or the superficial heat
Lindstrom 1970	This is a randomized controlled trial of 62 patients with low-back pain and sciatica. The interventions were: 1) hot packs, massage, mobilizing and strengthening exercises for the spine, 2) intermittent pelvic traction, isometric training of the abdominal and hip extensor muscles, and 3) hot packs and rest only. This RCT was excluded because the effects of massage could not be extracted separately
Mandala 2001	This randomized trial was published in abstract only.
Maniche 1988	Three articles reporting on the same controlled trial of intensive extensor exercises compared to 1) light extensor exercises and 2) thermotherapy, massage and mild exercises. It is excluded from this review because the effects of massage therapy cannot be extracted separately from the other therapies
Melzack 1980	Intervention was ice massage, which consisted of holding an ice cube with a gauze pad and gently massaging the skin. In this case it is difficult to know if the therapeutic effect was due to the superficial cold or the massage
Melzack 1983	This randomized trial was included in the two previous versions of this systematic review (Furlan 2000 and Furlan 2003). However, we decided to exclude this trial in this update because it uses massage as a control group for another active intervention, and therefore massage therapy was not delivered appropriately as it is in practice
Pope 1994	This randomized trial was included in the two previous versions of this systematic review (Furlan 2000 and Furlan 2003). However, we decided to exclude this trial in this update because it uses massage as a control group for another active intervention, and therefore massage therapy was not delivered appropriately as it is in practice
Walach 2003	This is a randomized trial of classic massage compared to standard medical care. It was excluded because it included a mixed population of back, neck, shoulders, head and limbs pain
Werners 1999	This is a randomized controlled trial of 152 patients with low-back pain in a primary care setting, comparing interferential therapy with motorized lumbar traction plus massage. It is excluded from this review because the effects of massage could not be extracted separately

(Continued)

Wilkinson 1997	<p>This Master's thesis investigated the effect of therapeutic touch on the acute pain experience in postoperative lumbar laminectomy patients. Twenty patients were randomly assigned to either the therapeutic touch or placebo mimic intervention. A visual analogue scale was used to measure the subject's pain before and one hour after treatment. Posttest pain scores of the two groups were not significantly different.</p> <p>This randomized trial was excluded from this review because the intervention did not involve touch, and did not have manual contact between the therapist and patient. Hands were moved over the subject's body from head to toe at a distance of two to four inches over the body</p>
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DATA AND ANALYSES

Comparison 1. Massage versus sham treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity (higher values mean more pain)	2		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.1 Short-term follow-up	2	91	Std. Mean Difference (IV, Random, 95% CI)	-0.92 [-1.35, -0.48]
1.2 Long-term follow-up	1	51	Std. Mean Difference (IV, Random, 95% CI)	-0.49 [-1.05, 0.06]
2 Pain quality	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
3 Back-specific functional status (higher scores mean more disability)	2		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
3.1 Short-term follow-up	2	91	Std. Mean Difference (IV, Random, 95% CI)	-1.76 [-3.19, -0.32]
3.2 Long-term follow-up	1	46	Std. Mean Difference (IV, Random, 95% CI)	-0.96 [-1.58, -0.35]

Comparison 2. Massage versus manipulation/mobilization

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity (higher values mean more pain)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 3. Massage versus exercises

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity (0: no pain; 5: excruciating pain)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Pain quality	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
3 Back-specific functional status (RDQ, 0-24, scores >14 indicate poor outcomes)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
3.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

3.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
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Comparison 4. Massage versus relaxation

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity (VITAS: present pain with a VAS ranging from 0 to 10)	2		Mean Difference (IV, Random, 95% CI)	Subtotals only
1.1 Short-term follow-up	2	54	Mean Difference (IV, Random, 95% CI)	-1.27 [-2.46, -0.08]
2 Pain quality	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 5. Massage versus acupuncture

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity / symptom bothersomeness	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up (10 weeks after randomization)	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up (52 weeks after randomization)	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up (10 weeks after randomization)	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up (52 weeks after randomization)	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 6. Massage versus self-care education

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity / symptom bothersomeness	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up (10 weeks after randomization)	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up (52 weeks after randomization)	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function	1		Mean Difference (IV, Random, 95% CI)	Totals not selected

2.1 Short-term follow-up (10 weeks after randomization)	1	Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up (52 weeks after randomization)	1	Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 7. Acupuncture massage versus physical therapy

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity	2		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.1 Short-term follow-up	2	266	Std. Mean Difference (IV, Random, 95% CI)	-0.72 [-0.96, -0.47]
1.2 Long-term follow-up	2	250	Std. Mean Difference (IV, Random, 95% CI)	-0.95 [-1.39, -0.51]
2 Function (Roland and Morris disability questionnaire)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 8. Acupuncture massage versus classic massage

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Massage plus individual exercise. Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Massage plus group exercise. Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function (values less than 70% indicate poor functional status, range from 0 to 100%)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Massage plus individual exercise. Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Massage plus group exercise. Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 9. Thai massage versus Swedish massage

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function (Oswestry Disability Index)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 10. Massage + exercise + education versus massage alone

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity (0: no pain; 5: excruciating pain)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Pain quality	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
3 Back-specific functional status (RMDQ, 0-24, scores >14 indicate poor outcomes)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
3.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
3.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 11. Massage + exercise + education versus sham treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity (0: no pain; 5: excruciating pain)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Pain quality	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
3 Back-specific functional status (RMDQ, 0-24, scores >14 indicate poor outcomes)	1		Mean Difference (IV, Random, 95% CI)	Totals not selected

3.1 Short-term follow-up	1	Mean Difference (IV, Random, 95% CI)	Not estimable
3.2 Long-term follow-up	1	Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 12. Acupuncture massage + conventional treatment versus conventional treatment alone

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 13. Massage + exercise versus Sham Massage + exercise

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity	2		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	0		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up	2		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function	2		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	0		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	2		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 14. Foot reflexology versus relaxation

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Comparison 15. Foot reflexology + usual care versus usual care alone

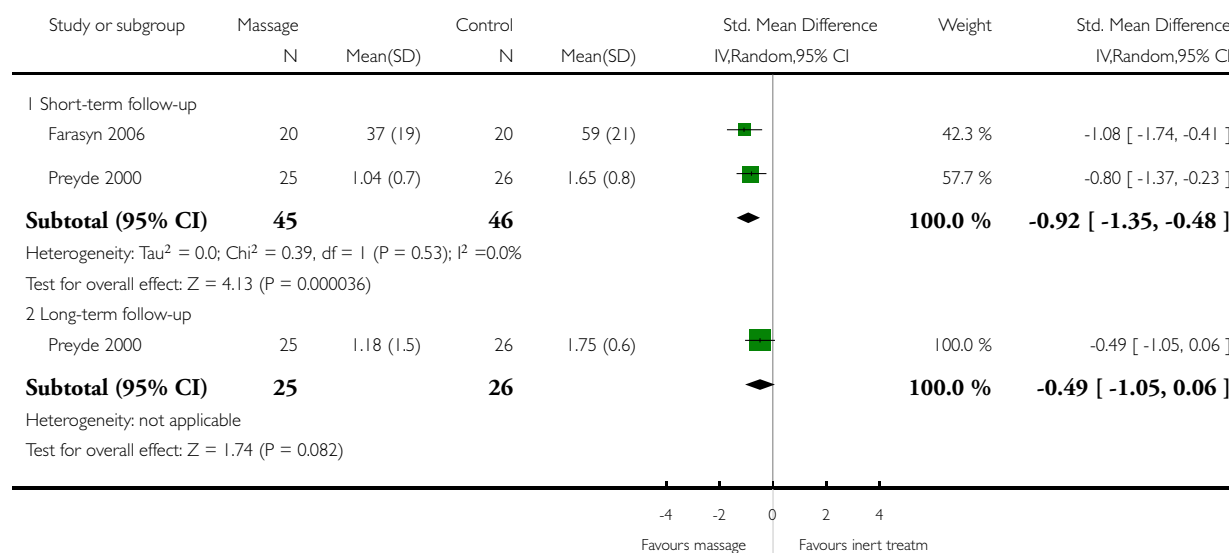
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain intensity	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
1.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2 Function	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.1 Short-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable
2.2 Long-term follow-up	1		Mean Difference (IV, Random, 95% CI)	Not estimable

Analysis 1.1. Comparison 1 Massage versus sham treatment, Outcome 1 Pain intensity (higher values mean more pain).

Review: Massage for low-back pain

Comparison: 1 Massage versus sham treatment

Outcome: 1 Pain intensity (higher values mean more pain)

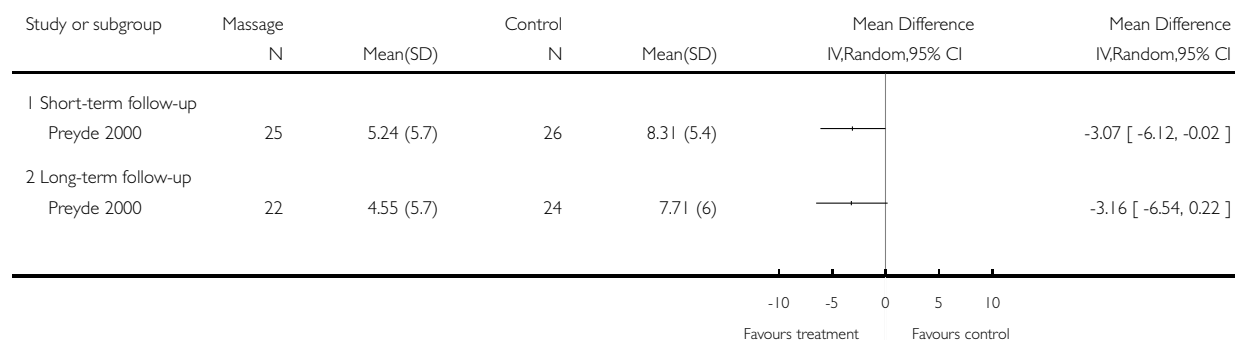


Analysis 1.2. Comparison 1 Message versus sham treatment, Outcome 2 Pain quality.

Review: Massage for low-back pain

Comparison: 1 Message versus sham treatment

Outcome: 2 Pain quality

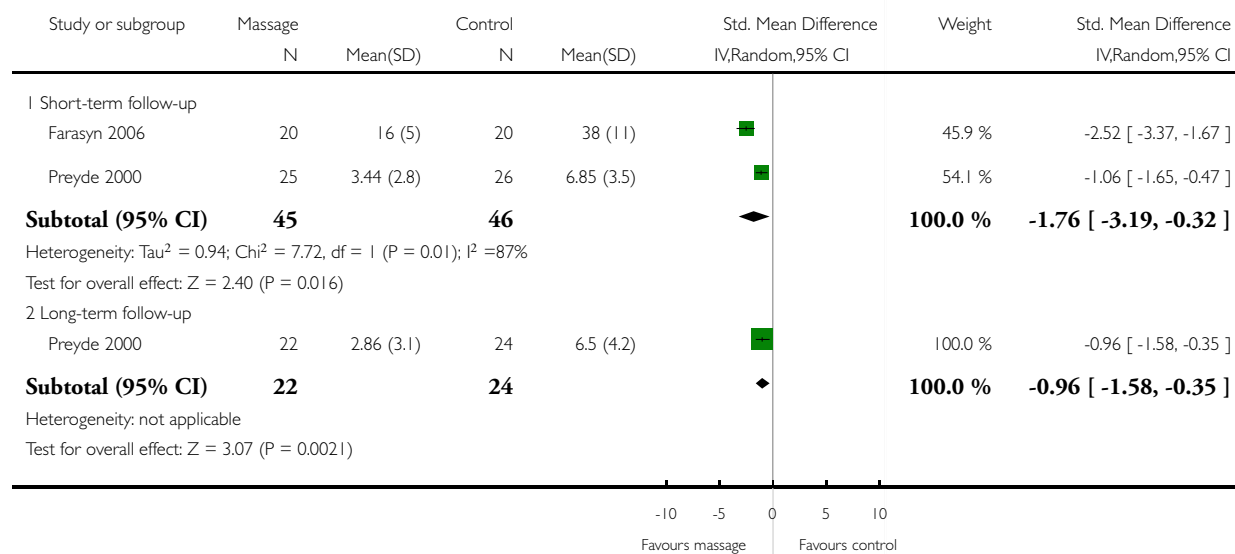


Analysis 1.3. Comparison 1 Message versus sham treatment, Outcome 3 Back-specific functional status (higher scores mean more disability).

Review: Massage for low-back pain

Comparison: 1 Message versus sham treatment

Outcome: 3 Back-specific functional status (higher scores mean more disability)

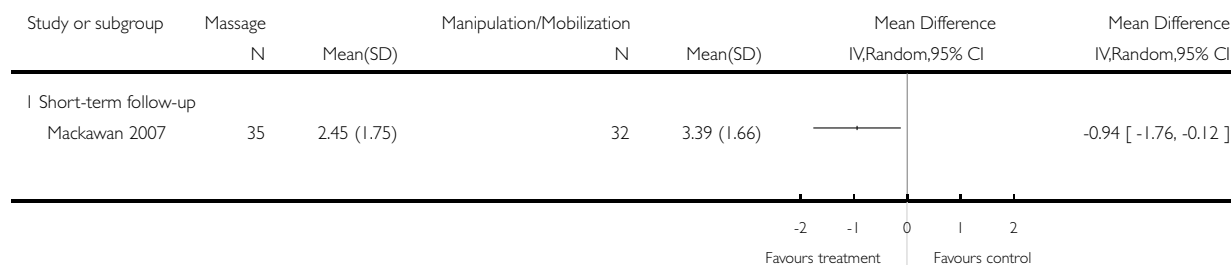


Analysis 2.1. Comparison 2 Massage versus manipulation/mobilization, Outcome 1 Pain intensity (higher values mean more pain).

Review: Massage for low-back pain

Comparison: 2 Massage versus manipulation/mobilization

Outcome: 1 Pain intensity (higher values mean more pain)

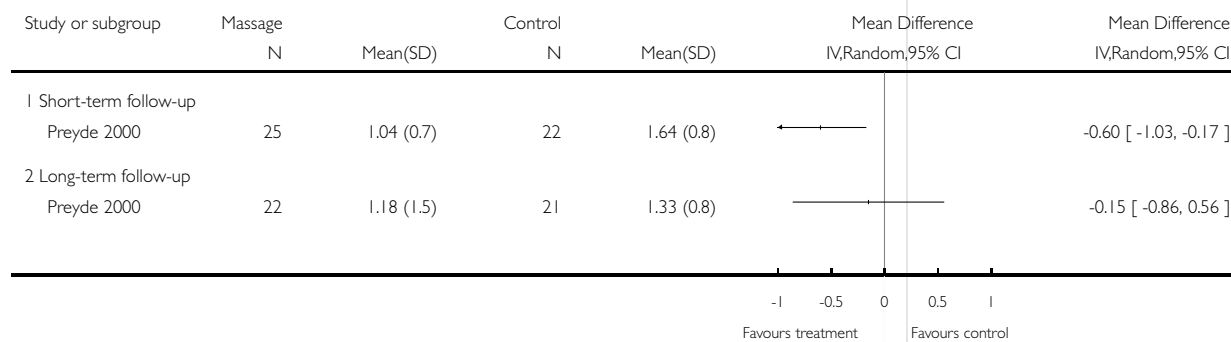


Analysis 3.1. Comparison 3 Massage versus exercises, Outcome 1 Pain intensity (0: no pain; 5: excruciating pain).

Review: Massage for low-back pain

Comparison: 3 Massage versus exercises

Outcome: 1 Pain intensity (0: no pain; 5: excruciating pain)

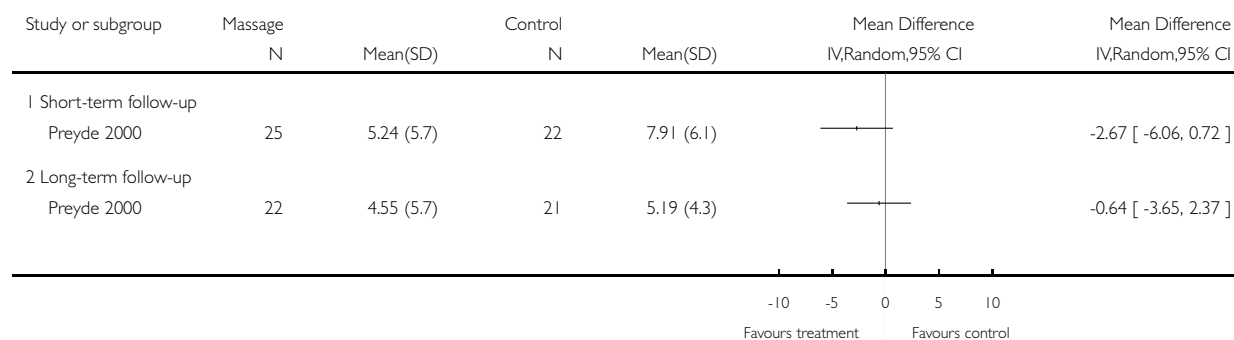


Analysis 3.2. Comparison 3 Massage versus exercises, Outcome 2 Pain quality.

Review: Massage for low-back pain

Comparison: 3 Massage versus exercises

Outcome: 2 Pain quality

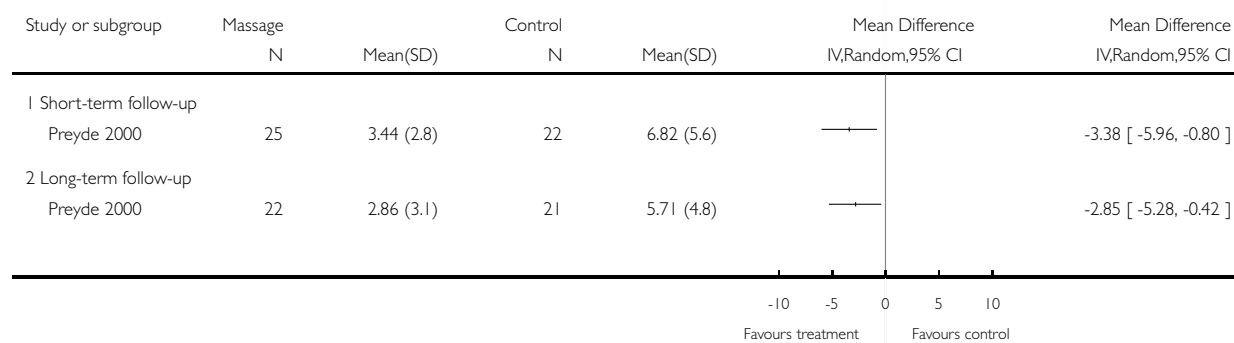


Analysis 3.3. Comparison 3 Massage versus exercises, Outcome 3 Back-specific functional status (RDQ, 0-24, scores >14 indicate poor outcomes).

Review: Massage for low-back pain

Comparison: 3 Massage versus exercises

Outcome: 3 Back-specific functional status (RDQ, 0-24, scores >14 indicate poor outcomes)

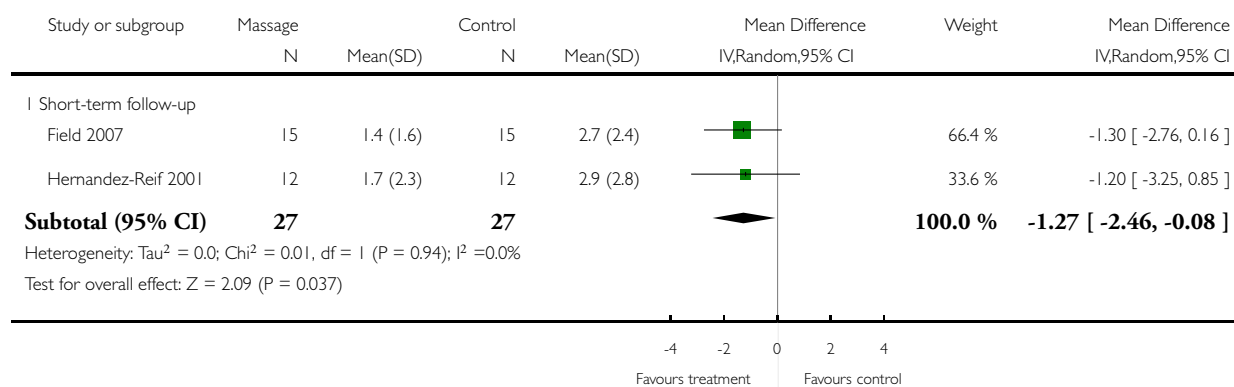


Analysis 4.1. Comparison 4 Massage versus relaxation, Outcome 1 Pain intensity (VITAS: present pain with a VAS ranging from 0 to 10).

Review: Massage for low-back pain

Comparison: 4 Massage versus relaxation

Outcome: 1 Pain intensity (VITAS: present pain with a VAS ranging from 0 to 10)

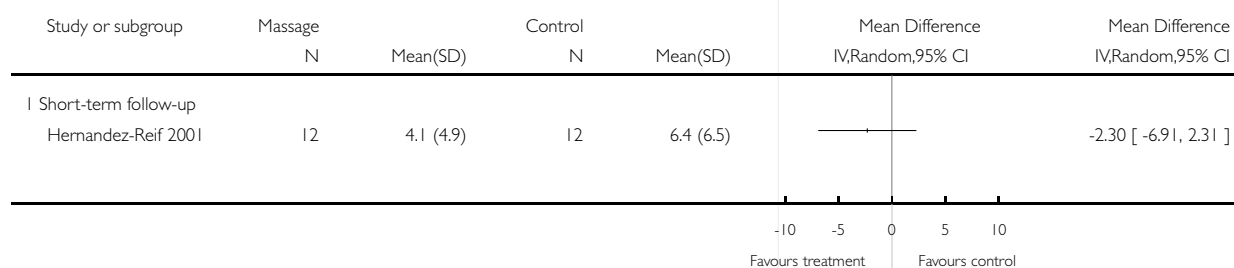


Analysis 4.2. Comparison 4 Massage versus relaxation, Outcome 2 Pain quality.

Review: Massage for low-back pain

Comparison: 4 Massage versus relaxation

Outcome: 2 Pain quality



Analysis 5.1. Comparison 5 Massage versus acupuncture, Outcome 1 Pain intensity / symptom bothersomeness.

Review: Massage for low-back pain

Comparison: 5 Massage versus acupuncture

Outcome: 1 Pain intensity / symptom bothersomeness

Study or subgroup	Massage		Control		Mean Difference IV,Random,95% CI	Mean Difference IV,Random,95% CI
	N	Mean(SD)	N	Mean(SD)		
1 Short-term follow-up (10 weeks after randomization)						
Cherkin 2001	78	3.6 (0.3)	94	4 (0.4)	—	-0.40 [-0.50, -0.30]
2 Long-term follow-up (52 weeks after randomization)						
Cherkin 2001	78	3.2 (0.4)	94	4.5 (0.4)	*	-1.30 [-1.42, -1.18]

-1 -0.5 0 0.5 1
Favours treatment Favours control

Analysis 5.2. Comparison 5 Massage versus acupuncture, Outcome 2 Function.

Review: Massage for low-back pain

Comparison: 5 Massage versus acupuncture

Outcome: 2 Function

Study or subgroup	Massage		Control		Mean Difference IV,Random,95% CI	Mean Difference IV,Random,95% CI
	N	Mean(SD)	N	Mean(SD)		
1 Short-term follow-up (10 weeks after randomization)						
Cherkin 2001	78	6.3 (0.6)	94	7.9 (0.7)	*	-1.60 [-1.79, -1.41]
2 Long-term follow-up (52 weeks after randomization)						
Cherkin 2001	78	6.8 (0.7)	94	8 (0.7)	*	-1.20 [-1.41, -0.99]

-10 -5 0 5 10
Favours treatment Favours control

Analysis 6.1. Comparison 6 Massage versus self-care education, Outcome 1 Pain intensity / symptom bothersomeness.

Review: Massage for low-back pain

Comparison: 6 Massage versus self-care education

Outcome: 1 Pain intensity / symptom bothersomeness

Study or subgroup	Massage		Control		Mean Difference IV,Random,95% CI	Mean Difference IV,Random,95% CI
	N	Mean(SD)	N	Mean(SD)		
1 Short-term follow-up (10 weeks after randomization)						
Cherkin 2001	78	3.6 (0.3)	90	4.6 (0.4)	*-	-1.00 [-1.11, -0.89]
2 Long-term follow-up (52 weeks after randomization)						
Cherkin 2001	78	3.2 (0.4)	90	3.8 (0.4)	+-	-0.60 [-0.72, -0.48]

-1 -0.5 0 0.5 1
Favours treatment Favours control

Analysis 6.2. Comparison 6 Massage versus self-care education, Outcome 2 Function.

Review: Massage for low-back pain

Comparison: 6 Massage versus self-care education

Outcome: 2 Function

Study or subgroup	Massage		Control		Mean Difference IV,Random,95% CI	Mean Difference IV,Random,95% CI
	N	Mean(SD)	N	Mean(SD)		
1 Short-term follow-up (10 weeks after randomization)						
Cherkin 2001	78	6.3 (0.6)	90	8.8 (0.7)	*	-2.50 [-2.70, -2.30]
2 Long-term follow-up (52 weeks after randomization)						
Cherkin 2001	78	6.8 (0.7)	90	6.4 (0.7)	*	0.40 [0.19, 0.61]

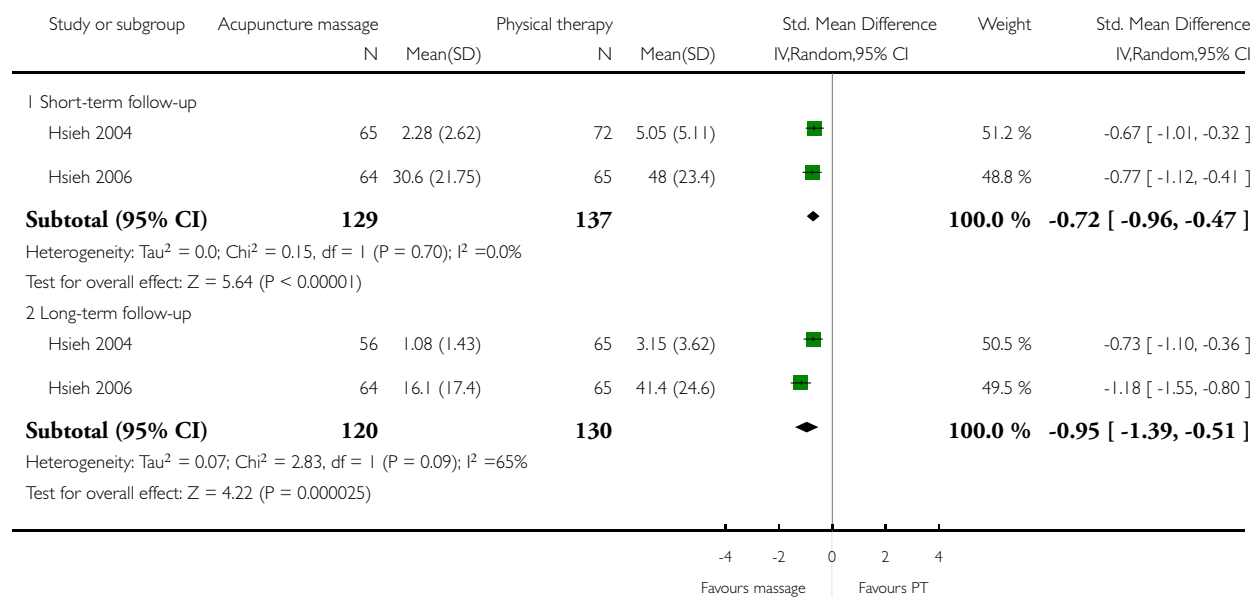
-10 -5 0 5 10
Favours treatment Favours control

Analysis 7.1. Comparison 7 Acupuncture massage versus physical therapy, Outcome 1 Pain intensity.

Review: Massage for low-back pain

Comparison: 7 Acupuncture massage versus physical therapy

Outcome: 1 Pain intensity



Analysis 7.2. Comparison 7 Acupuncture massage versus physical therapy, Outcome 2 Function (Roland and Morris disability questionnaire).

Review: Massage for low-back pain

Comparison: 7 Acupuncture massage versus physical therapy

Outcome: 2 Function (Roland and Morris disability questionnaire)



Analysis 8.1. Comparison 8 Acupuncture massage versus classic massage, Outcome 1 Pain intensity.

Review: Massage for low-back pain

Comparison: 8 Acupuncture massage versus classic massage

Outcome: 1 Pain intensity

Study or subgroup	Acupuncture massage		Classic massage		Mean Difference IV,Random,95% CI	Mean Difference IV,Random,95% CI
	N	Mean(SD)	N	Mean(SD)		
1 Massage plus individual exercise. Short-term follow-up						
Franke 2000	46	3.57 (0.4)	49	3.2 (0.4)	0.37	[0.21, 0.53]
2 Massage plus group exercise. Short-term follow-up						
Franke 2000	46	2.54 (0.3)	49	3.78 (0.3)	-1.24	[-1.36, -1.12]

-10 -5 0 5 10
Favours acup massage Favours classic mass

Analysis 8.2. Comparison 8 Acupuncture massage versus classic massage, Outcome 2 Function (values less than 70% indicate poor functional status, range from 0 to 100%).

Review: Massage for low-back pain

Comparison: 8 Acupuncture massage versus classic massage

Outcome: 2 Function (values less than 70% indicate poor functional status, range from 0 to 100%)

Study or subgroup	Acupuncture massage		Classic massage		Mean Difference IV,Random,95% CI	Mean Difference IV,Random,95% CI
	N	Mean(SD)	N	Mean(SD)		
1 Massage plus individual exercise. Short-term follow-up						
Franke 2000	46	67.4 (1.9)	49	68.5 (2.7)	-1.10	[-2.03, -0.17]
2 Massage plus group exercise. Short-term follow-up						
Franke 2000	46	73.5 (2.4)	49	67.7 (2.45)	5.80	[4.82, 6.78]

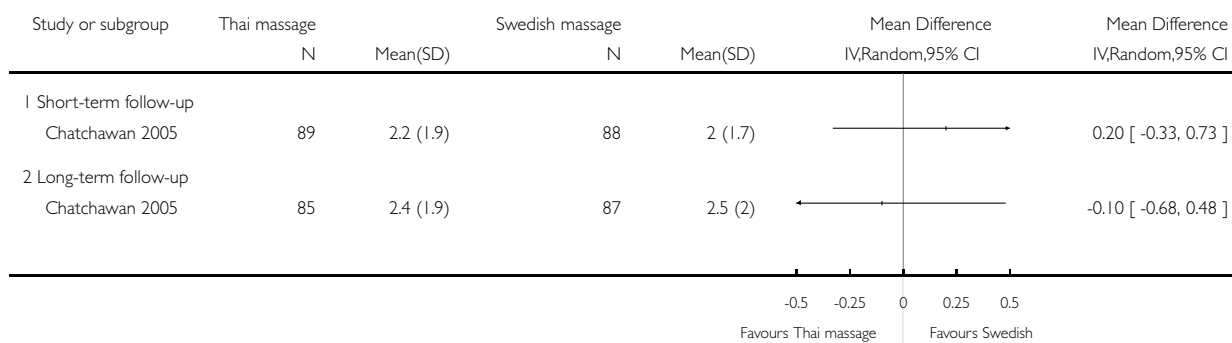
-10 -5 0 5 10
Favours classic mass Favours acup massage

Analysis 9.1. Comparison 9 Thai massage versus Swedish massage, Outcome 1 Pain intensity.

Review: Massage for low-back pain

Comparison: 9 Thai massage versus Swedish massage

Outcome: 1 Pain intensity

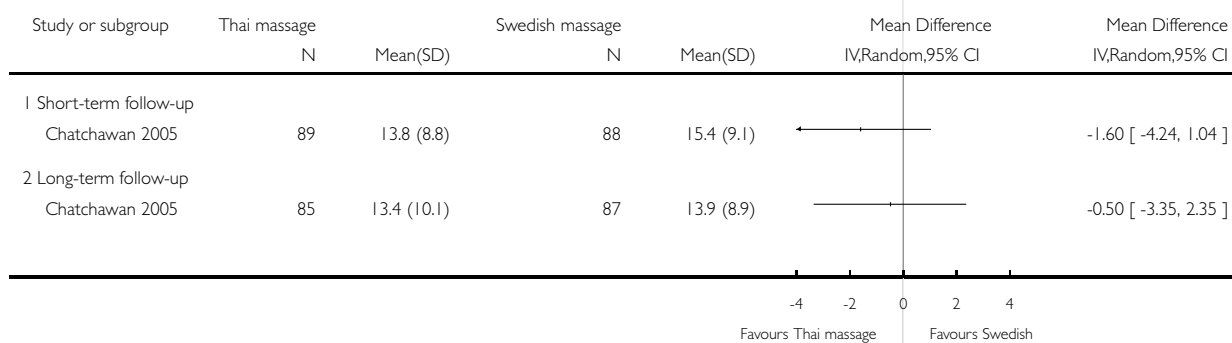


Analysis 9.2. Comparison 9 Thai massage versus Swedish massage, Outcome 2 Function (Oswestry Disability Index).

Review: Massage for low-back pain

Comparison: 9 Thai massage versus Swedish massage

Outcome: 2 Function (Oswestry Disability Index)

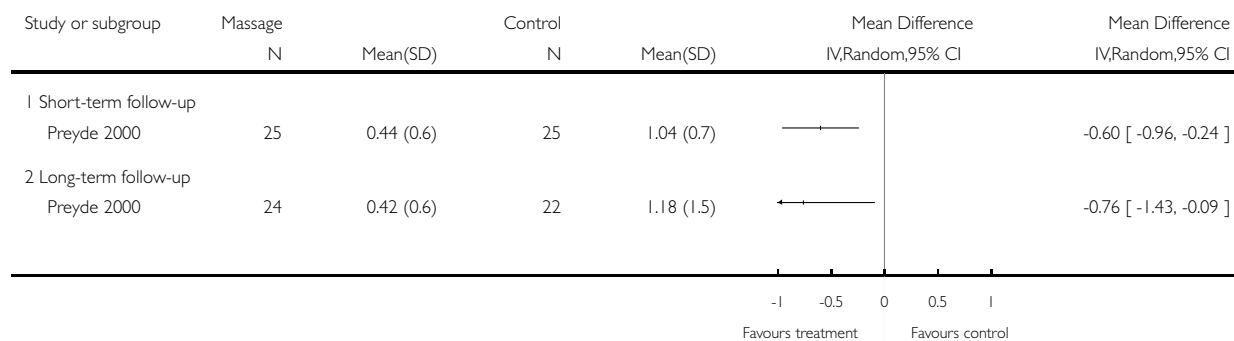


Analysis 10.1. Comparison 10 Massage + exercise + education versus massage alone, Outcome 1 Pain intensity (0: no pain; 5: excruciating pain).

Review: Massage for low-back pain

Comparison: 10 Massage + exercise + education versus massage alone

Outcome: 1 Pain intensity (0: no pain; 5: excruciating pain)

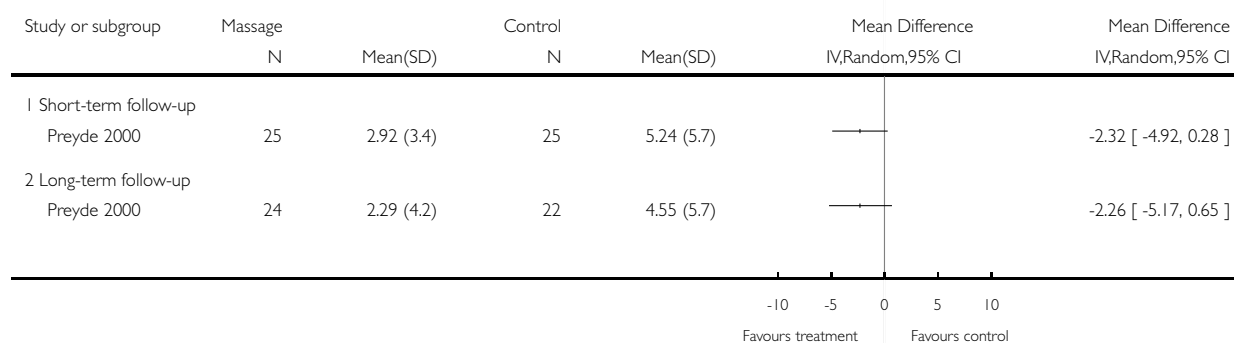


Analysis 10.2. Comparison 10 Massage + exercise + education versus massage alone, Outcome 2 Pain quality.

Review: Massage for low-back pain

Comparison: 10 Massage + exercise + education versus massage alone

Outcome: 2 Pain quality

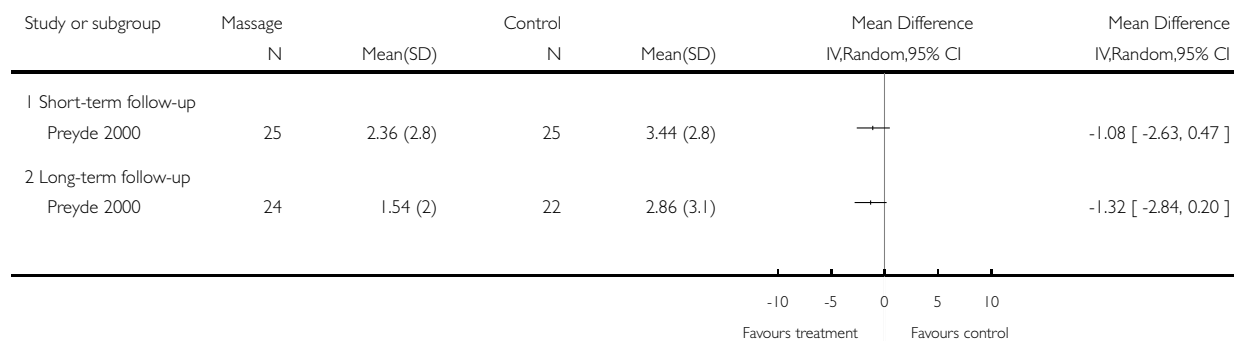


Analysis 10.3. Comparison 10 Massage + exercise + education versus massage alone, Outcome 3 Back-specific functional status (RMDQ, 0-24, scores >14 indicate poor outcomes).

Review: Massage for low-back pain

Comparison: 10 Massage + exercise + education versus massage alone

Outcome: 3 Back-specific functional status (RMDQ, 0-24, scores >14 indicate poor outcomes)

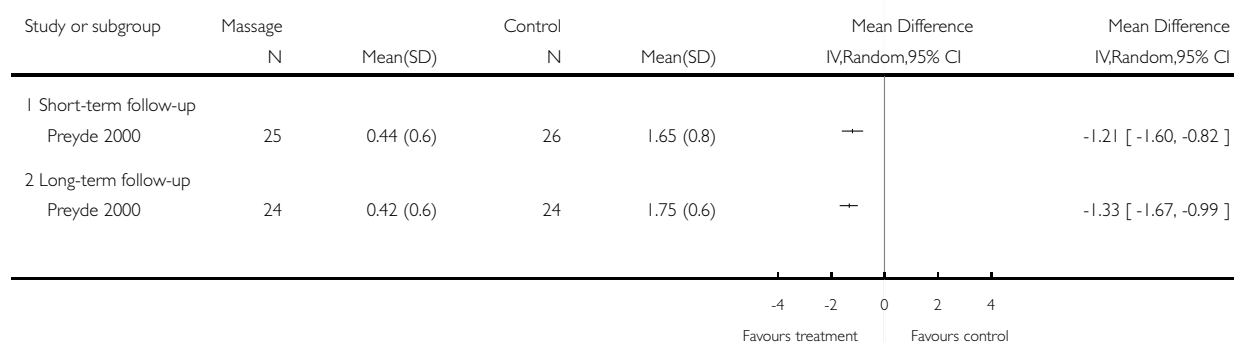


Analysis 11.1. Comparison 11 Massage + exercise + education versus sham treatment, Outcome 1 Pain intensity (0: no pain; 5: excruciating pain).

Review: Massage for low-back pain

Comparison: 11 Massage + exercise + education versus sham treatment

Outcome: 1 Pain intensity (0: no pain; 5: excruciating pain)

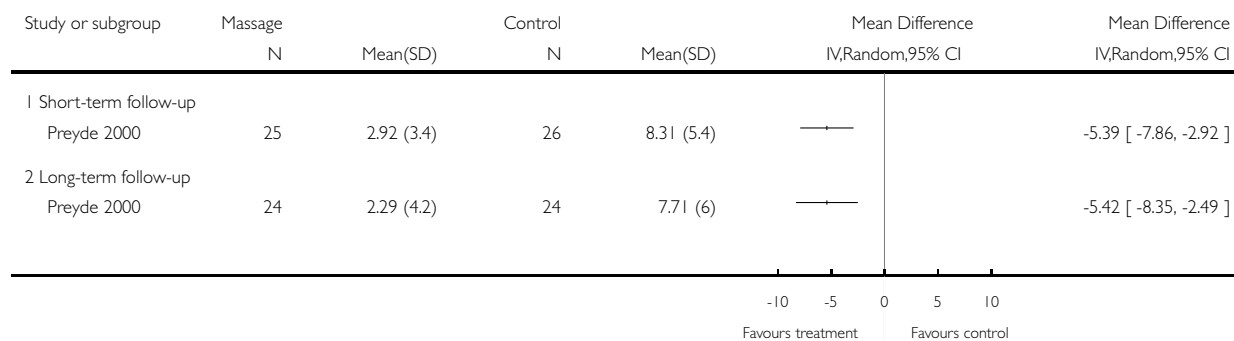


Analysis 11.2. Comparison 11 Massage + exercise + education versus sham treatment, Outcome 2 Pain quality.

Review: Massage for low-back pain

Comparison: 11 Massage + exercise + education versus sham treatment

Outcome: 2 Pain quality

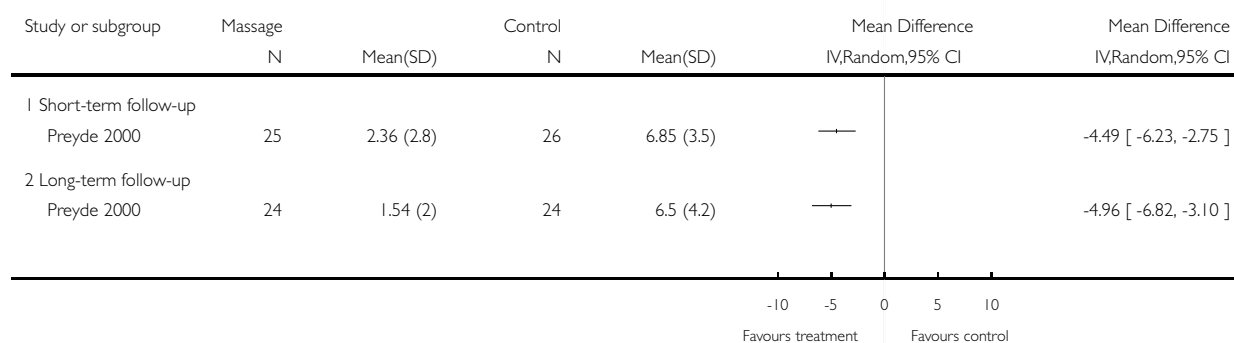


Analysis 11.3. Comparison 11 Massage + exercise + education versus sham treatment, Outcome 3 Back-specific functional status (RMDQ, 0-24, scores >14 indicate poor outcomes).

Review: Massage for low-back pain

Comparison: 11 Massage + exercise + education versus sham treatment

Outcome: 3 Back-specific functional status (RMDQ, 0-24, scores >14 indicate poor outcomes)

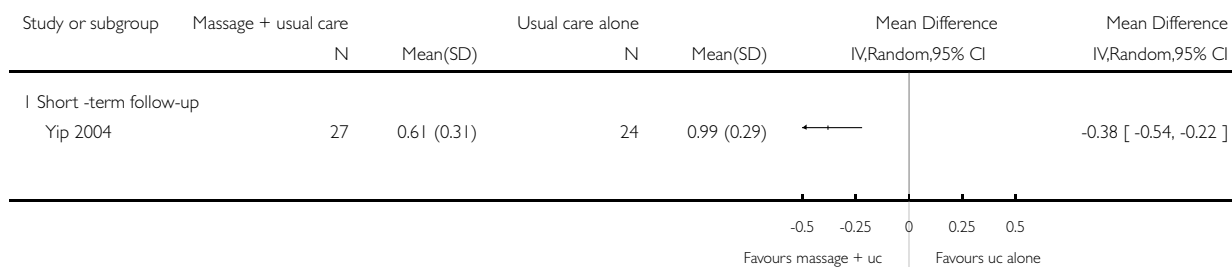


Analysis 12.1. Comparison 12 Acupuncture massage + conventional treatment versus conventional treatment alone, Outcome 1 Pain intensity.

Review: Massage for low-back pain

Comparison: 12 Acupuncture massage + conventional treatment versus conventional treatment alone

Outcome: 1 Pain intensity

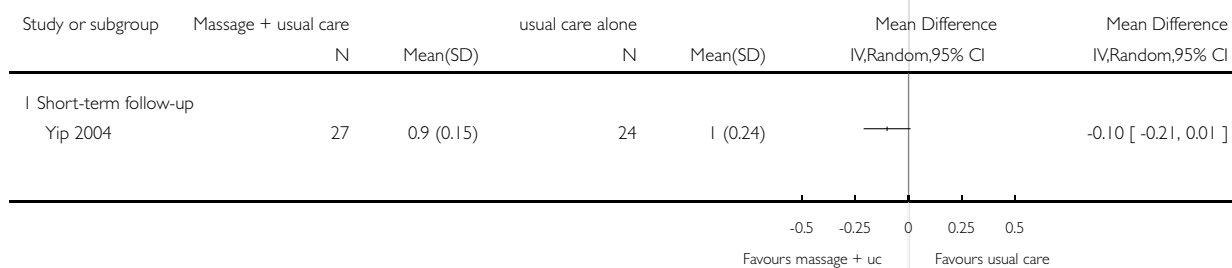


Analysis 12.2. Comparison 12 Acupuncture massage + conventional treatment versus conventional treatment alone, Outcome 2 Function.

Review: Massage for low-back pain

Comparison: 12 Acupuncture massage + conventional treatment versus conventional treatment alone

Outcome: 2 Function

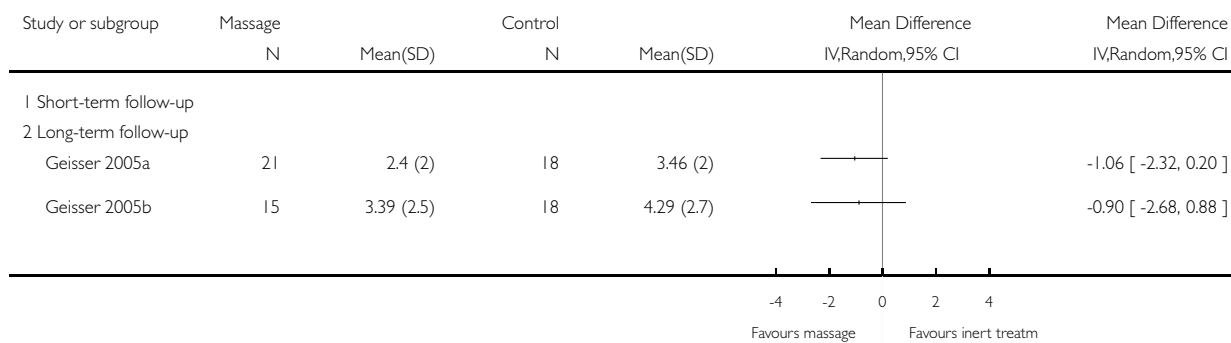


Analysis 13.1. Comparison 13 Massage + exercise versus Sham Massage + exercise, Outcome 1 Pain intensity.

Review: Massage for low-back pain

Comparison: 13 Massage + exercise versus Sham Massage + exercise

Outcome: 1 Pain intensity

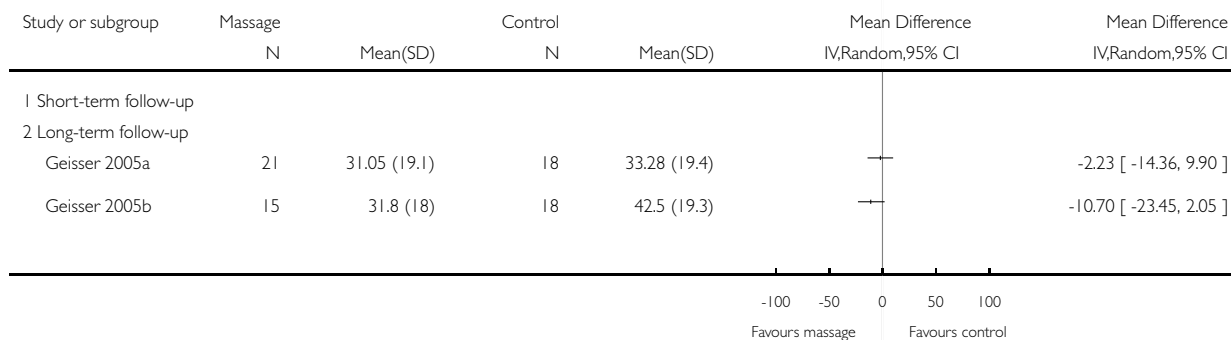


Analysis 13.2. Comparison 13 Massage + exercise versus Sham Massage + exercise, Outcome 2 Function.

Review: Massage for low-back pain

Comparison: 13 Massage + exercise versus Sham Massage + exercise

Outcome: 2 Function

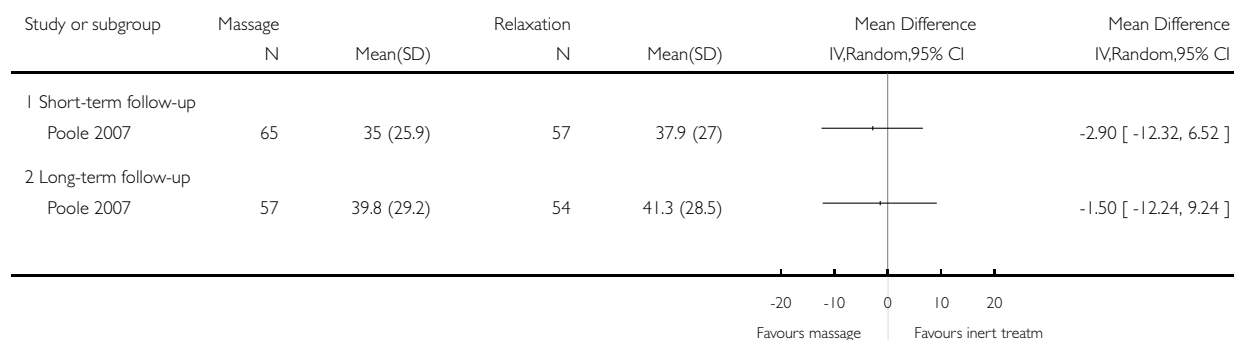


Analysis 14.1. Comparison 14 Foot reflexology versus relaxation, Outcome 1 Pain intensity.

Review: Massage for low-back pain

Comparison: 14 Foot reflexology versus relaxation

Outcome: 1 Pain intensity

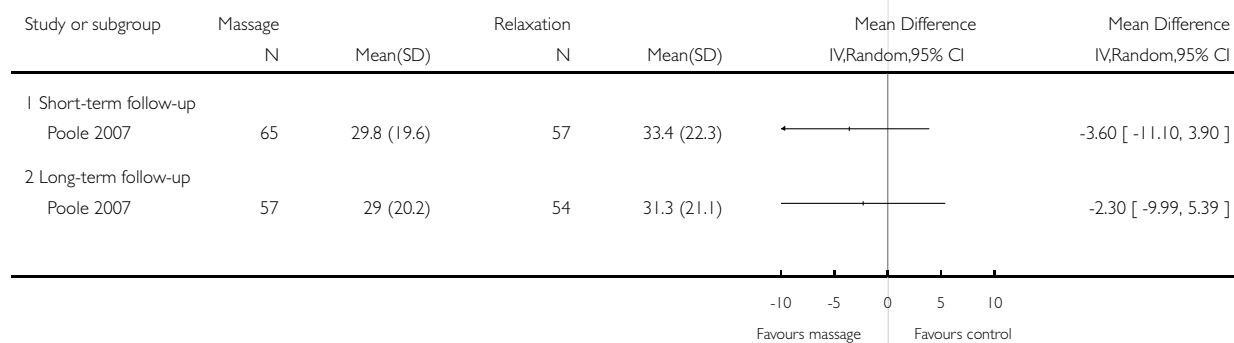


Analysis 14.2. Comparison 14 Foot reflexology versus relaxation, Outcome 2 Function.

Review: Massage for low-back pain

Comparison: 14 Foot reflexology versus relaxation

Outcome: 2 Function

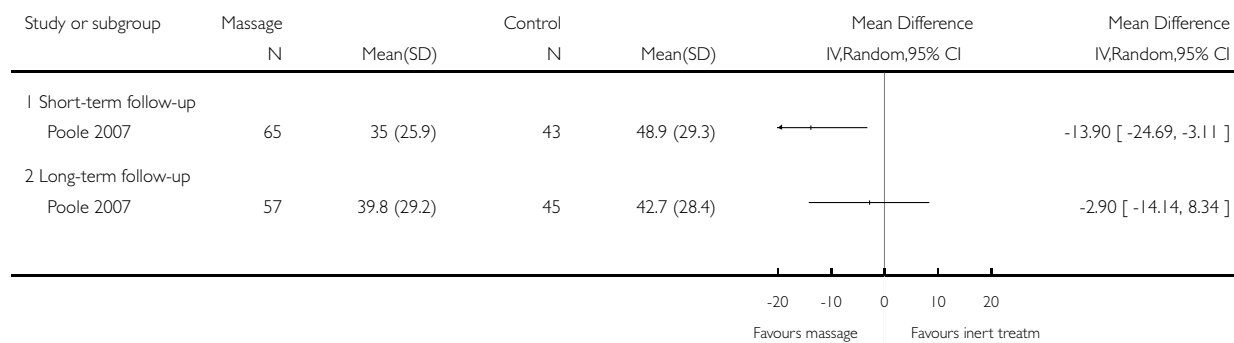


Analysis 15.1. Comparison 15 Foot reflexology + usual care versus usual care alone, Outcome 1 Pain intensity.

Review: Massage for low-back pain

Comparison: 15 Foot reflexology + usual care versus usual care alone

Outcome: 1 Pain intensity

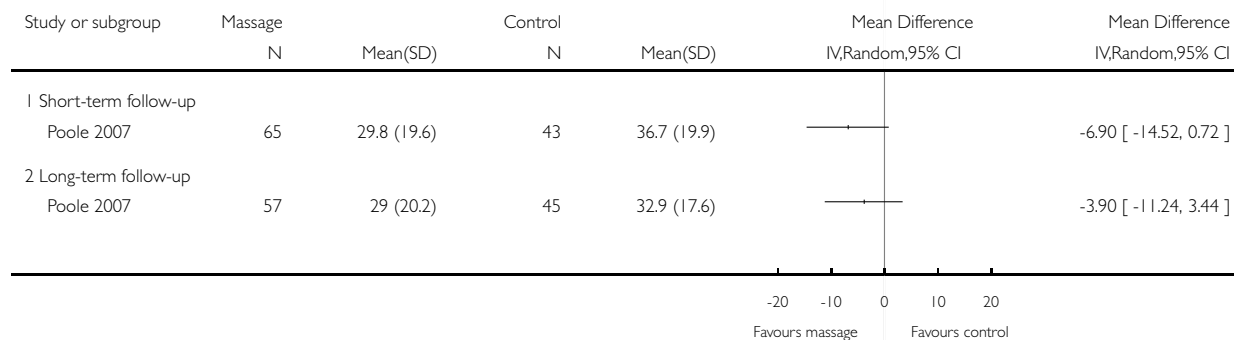


Analysis 15.2. Comparison 15 Foot reflexology + usual care versus usual care alone, Outcome 2 Function.

Review: Massage for low-back pain

Comparison: 15 Foot reflexology + usual care versus usual care alone

Outcome: 2 Function



ADDITIONAL TABLES

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-fibre-friction,	Contract-relax, passive stretching, resistive stretching, rocking	Direction of energy, smoothing, direct pressure, holding, rocking, traction

Table 2. Criteria used to assess risk of bias (van Tulder 2003)

Criteria/Definitions
Was the method of randomisation adequate? A random (unpredictable) assignment sequence. Examples of adequate methods are computer-generated random numbers table and use of sealed opaque envelopes. Methods of allocation using date of birth, date of admission, hospital numbers, or alternation should not be regarded as appropriate.
Was the treatment allocation concealed? Assignment generated by an independent person not responsible for determining the eligibility of the patients. This person has no information about the persons included in the trial and has no influence on the assignment sequence or on the decision about eligibility of the patient.
Was the patient blinded to the intervention? The review author determines if enough information about the blinding is given in order to score a "yes."
Was the care provider blinded to the intervention? The review author determines if enough information about the blinding is given in order to score a "yes."
Was the outcome assessor blinded to the intervention? The review author determines if enough information about the blinding is given in order to score a "yes."
Was the drop-out rate described and acceptable? The number of participants who were included in the study but did not complete the observation period or were not included in the analysis must be described and reasons given. If the percentage of withdrawals and drop-outs does not exceed 20% for immediate and short-term follow-ups, 30% for intermediate and long-term follow-ups and does not lead to substantial bias a "yes" is scored.
Did the analysis include an intention-to-treat analysis? All randomized patients are reported/analyzed in the group to which they were allocated by randomization for the most important moments of effect measurement (minus missing values), irrespective of noncompliance and co-interventions
Were the groups similar at baseline regarding the most important prognostic indicators? In order to receive a "yes," groups have to

Table 2. Criteria used to assess risk of bias (van Tulder 2003) (Continued)

be similar at baseline regarding demographic factors, duration and severity of complaints, percentage of patients with neurological symptoms, and value of main outcome measure(s).

Were co-interventions avoided or similar? Co-interventions should either be avoided in the trial design or be similar between the index and control groups.

Was the compliance acceptable in all groups? The review author determines if the compliance to the interventions is acceptable, based on the reported intensity, duration, number and frequency of sessions for both the index intervention and control intervention(s).

Was the timing of the outcome assessment in all groups similar? Timing of outcome assessment should be identical for all intervention groups and for all important outcome assessments

APPENDICES

Appendix I. Electronic search strategies

MEDLINE

1exp "Clinical Trial [Publication Type]"/

2randomized.ab,ti.

3placebo.ab,ti.

4dt.fs.

5randomly.ab,ti.

6trial.ab,ti.

7groups.ab,ti.

8or/1-7

9Animals/

10Humans/

119 not (9 and 10)

128 not 11

13dorsalgia.ti,ab.

14exp Back Pain/

15backache.ti,ab.

16(lumbar adj pain).ti,ab.

17coccyx.ti,ab.

18coccydynia.ti,ab.

19sciatica.ti,ab.

20sciatica/

21spondylosis.ti,ab.

22lumbago.ti,ab.

23exp low back pain/

24or/13-23

25exp Massage/

26exp Therapeutic Touch/

27exp Reflexotherapy/

28myotherapy.mp.

29rolfing.mp.
30shiatsu.mp.
31exp Acupressure/
32reflexology.mp.
33(polarity adj therapy).mp.
34(myofascial adj release).mp.
35(craniosacral adj therapy).mp.
36reiki.mp.
37(trager adj psychophysical).mp.
38(hakomi adj method).mp.
39(jin adj shin).mp.
40(neuromuscular adj therapy).mp.
41(pfirmer adj25 therapy).mp.
42(alexander adj technique).mp.
43(feldenkrais adj method).mp.
44or/25-43
4512 and 24 and 44
46limit 45 to yr="2006 - 2007"

EMBASE

1Clinical Article/
2exp Clinical Study/
3Clinical Trial/
4Controlled Study/
5Randomized Controlled Trial/
6Major Clinical Study/
7Double Blind Procedure/
8Multicenter Study/
9Single Blind Procedure/
10Phase 3 Clinical Trial/
11Phase 4 Clinical Trial/
12crossover procedure/
13placebo/
14or/1-13
15allocat\$.mp.
16assign\$.mp.
17blind\$.mp.
18(clinic\$ adj25 (study or trial)).mp.
19compar\$.mp.
20control\$.mp.
21cross?over.mp.
22factorial\$.mp.
23follow?up.mp.
24placebo\$.mp.
25prospectiv\$.mp.
26random\$.mp.
27((singl\$ or doubl\$ or trebl\$ or tripl\$) adj25 (blind\$ or mask\$)).mp.
28trial.mp.
29(versus or vs).mp.
30or/15-29
3114 and 30
32human/
33Nonhuman/
34exp ANIMAL/

35Animal Experiment/
3633 or 34 or 35
3732 not 36
3831 not 36
3937 and 38
4038 or 39
41dorsalgia.mp.
42back pain.mp.
43exp BACKACHE/
44(lumbar adj pain).mp.
45coccyx.mp.
46coccydynia.mp.
47sciatica.mp.
48exp ISCHIALGIA/
49spondylosis.mp.
50lumbago.mp.
51exp Low Back Pain/
52or/41-51
53exp massage/
54therapeutic touch.mp.
55reflexotherapy.mp.
56exp ROLFING/
57exp SHIATSU/
58exp reflexology/
59myotherapy.mp.
60(polarity adj therapy).mp.
61(myofascial adj release).mp.
62(craniosacral adj therapy).mp.
63exp REIKI/
64(trager adj psychophysical).mp.
65(hakomi adj method).mp.
66(jin adj shin).mp.
67(neuromuscular adj therapy).mp.
68(pfirmer adj25 therapy).mp.
69(alexander adj technique).mp.
70exp Alexander Technique/
71(feldenkrais adj method).mp.
72MASSAGEMETHODEN.mp.
73MASSAGEINST.mp.
74MASSAGEBEHANDLUNG.mp.
75MASSAGEE.mp.
76MASSAGED.mp.
77MASSAGE-WERE.mp.
78MASSAGE-TYPE.mp.
79MASSAGE-TUINA-THERAPIE.mp.
80MASSAGE-LIKE.mp.
81MASSAGE-INDUCED.mp.
82MASSAGE-ENHANCED.mp.
83MASSAGE-CONTROL.mp.
84MASSAGE-CONTINUED.mp.
85MASSAGE-AND-PRESSURE.mp.
86or/53-85
8740 and 52 and 86

88limit 87 to yr="2006 - 2008"

CINAHL

1Randomized Controlled Trials.mp.
2clinical trial.pt.
3exp Clinical Trials/
4(clin\$ adj25 trial\$).tw.
5((singl\$ or doubl\$ or trebl\$ or tripl\$) adj25 (blind\$ or mask\$)).tw.
6exp PLACEBOS/
7placebo\$.tw.
8random\$.tw.
9exp Study Design/
10(latin\$ adj square).tw.
11exp Comparative Studies/
12exp Evaluation Research/
13Follow-Up Studies.mp.
14exp Prospective Studies/
15(control\$ or prospectiv\$ or volunteer\$).tw.
16Animals/
17or/1-15
1817 not 16
19dorsalgia.mp.
20exp Back Pain/
21backache.mp.
22(lumbar adj pain).mp.
23exp COCCYX/
24exp SCIATICA/
25coccyx.mp.
26sciatica.mp.
27exp Low Back Pain/
28coccydynia.mp.
29sciatica.mp. or exp SCIATICA/
30exp Lumbar Vertebrae/ or exp Spondylolisthesis/ or exp Spondylolysis/
31lumbago.mp.
32or/19-31
33exp MASSAGE/
34exp Therapeutic Touch/
35reflexotherapy.mp.
36exp ROLFING/
37exp SHIATSU/
38exp REFLEXOLOGY/
39myotherapy.mp.
40(polarity adj therapy).mp.
41(myofascial adj release).mp.
42(craniosacral adj therapy).mp.
43exp REIKI/
44(trager adj psychophysical).mp.
45(hakomi adj method).mp.
46(jin adj shin).mp.
47(neuromuscular adj therapy).mp.
48(pfrimmer adj25 therapy).mp.
49(alexander adj technique).mp.
50exp Alexander Technique/
51(feldenkrais adj method).mp.

52or/33-51
5318 and 32 and 52
54limit 53 to yr="2006 - 2007"

WHAT'S NEW

Last assessed as up-to-date: 9 July 2008.

Date	Event	Description
11 May 2010	Amended	Contact details updated.

HISTORY

Protocol first published: Issue 1, 2000

Review first published: Issue 4, 2000

Date	Event	Description
23 November 2009	Amended	Contact details updated.
11 July 2008	Amended	Converted to new review format.
10 July 2008	New citation required but conclusions have not changed	Five new trials were included in this second update of this review. The conclusions did not change
31 May 2008	New search has been performed	Literature search updated
31 January 2002	New citation required and conclusions have changed	This first update included four recent trials that were published since the original review. The conclusions changed in face of the new evidence.
31 January 2002	New search has been performed	literature search updated

CONTRIBUTIONS OF AUTHORS

EI conducted the searches

MI and AF selected the studies

AF, TD and MI assessed the risk of bias and extracted the data

AF wrote the final manuscript

MI, TD and EI reviewed and edited the final manuscript

DECLARATIONS OF INTEREST

None known

SOURCES OF SUPPORT

Internal sources

- Institute for Work & Health, Canada.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Massage [adverse effects]; Low Back Pain [*therapy]; Manipulation, Spinal; Randomized Controlled Trials as Topic

MeSH check words

Adult; Humans