Association of Spinal Manipulative Therapy With Clinical Benefit

and Harm for Acute Low Back Pain: Systematic Review

and Meta-analysis

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Commentary from the Illinois Chiropractic Society

JAMA Endorses Spinal Manipulation

For the second time in as many months, a prominent medical journal has endorsed spinal manipulation for the management of low back pain. [1] On April 11th 2017, JAMA published a systematic review of 26 randomized clinical trials in order to evaluate the safety and effectiveness of spinal manipulation for low back pain.

The authors concluded:

“Among patients with acute low back pain, spinal manipulative therapy was associated with improvements in pain and function with only transient minor musculoskeletal harms.”

This study comes on the heels of a February 2017 Clinical Practice Guideline from the

American College of Physicians recommending spinal manipulation for acute,

sub-acute, and chronic low back pain (LBP). [2]

These high-quality studies in respected medical journals add to a growing list of scientific support for spinal manipulation therapy (SMT). So why are our offices not flooded with medical referrals? An editorial accompanying the JAMA study provides perspective as to why some medical providers may be reluctant to refer to chiropractic physicians:

“Spinal manipulative therapy (SMT) is a controversial treatment option for low back pain, perhaps in part because it is most frequently administered by chiropractors. Chiropractic therapy is not widely accepted by some traditional health care practitioners. This may be, at least in part, because some early practitioners of chiropractic care rejected the germ theory, immunizations, and other scientific advances.

However, chiropractic care is popular today with the US public. According to a 2012 report, among patients with back or neck pain, approximately 30% sought care from a chiropractor. In a 2013 survey by Consumer Reports magazine involving 14,000 subscribers with low back pain, chiropractic care had the largest proportion of "highly satisfied" patients. Among approximately 4000 respondents who had seen a chiropractor, 59% were highly satisfied compared with 55% who saw a physical therapist and 34% who saw a primary care physician.

“Serious complications (related to SMT) are extremely rare… if spinal manipulation is at least as effective and as safe as conventional care, it may be an appropriate choice for patients with uncomplicated low back pain”. [3]

The emerging health care model dictates that all providers embrace proven clinically effective treatments, regardless of long-standing philosophical bias. If we expect medical providers to advance their thinking to accept validated chiropractic therapies, we must first be willing to reciprocate. By working together to provide evidence-based patient-centric care, we can advance our profession to become the undeniable first choice for both patients and providers.

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Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain:

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The Role of Spinal Manipulation in the Treatment of Low Back Pain

JAMA. 2017 (Apr 11); 317 (14): 1418–1419

The Abstract:

IMPORTANCE: Acute low back pain is common and spinal manipulative therapy (SMT) is a treatment option. Randomized clinical trials (RCTs) and meta-analyses have reported different conclusions about the effectiveness of SMT.

OBJECTIVE: To systematically review studies of the effectiveness and harms of SMT for acute (≤6 weeks) low back pain.

DATA SOURCES: Search of MEDLINE, Cochrane Database of Systematic Reviews, EMBASE, and Current Nursing and Allied Health Literature from January 1, 2011, through February 6, 2017, as well as identified systematic reviews and RCTs, for RCTs of adults with low back pain treated in ambulatory settings with SMT compared with sham or alternative treatments, and that measured pain or function outcomes for up to 6 weeks. Observational studies were included to assess harms.

DATA EXTRACTION AND SYNTHESIS: Data extraction was done in duplicate. Study quality was assessed using the Cochrane Back and Neck (CBN) Risk of Bias tool. This tool has 11 items in the following domains: randomization, concealment, baseline differences, blinding (patient), blinding (care provider [care provider is a specific quality metric used by the CBN Risk of Bias tool]), blinding (outcome), co-interventions, compliance, dropouts, timing, and intention to treat. Prior research has shown the CBN Risk of Bias tool identifies studies at an increased risk of bias using a threshold of 5 or 6 as a summary score. The evidence was assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria.

MAIN OUTCOMES AND MEASURES: Pain (measured by either the 100-mm visual analog scale, 11-point numeric rating scale, or other numeric pain scale), function (measured by the 24-point Roland Morris Disability Questionnaire or Oswestry Disability Index [range, 0-100]), or any harms measured within 6 weeks.

FINDINGS: Of 26 eligible RCTs identified, 15 RCTs (1,711 patients) provided moderate-quality evidence that SMT has a statistically significant association with improvements in pain (pooled mean improvement in the 100-mm visual analog pain scale, -9.95 [95% CI, -15.6 to -4.3]). Twelve RCTs (1,381 patients) produced moderate-quality evidence that SMT has a statistically significant association with improvements in function (pooled mean effect size, -0.39 [95% CI, -0.71 to -0.07]). Heterogeneity was not explained by type of clinician performing SMT, type of manipulation, study quality, or whether SMT was given alone or as part of a package of therapies. No RCT reported any serious adverse event. Minor transient adverse events such as increased pain, muscle stiffness, and headache were reported 50% to 67% of the time in large case series of patients treated with SMT.

CONCLUSIONS AND RELEVANCE: Among patients with acute low back pain, spinal manipulative therapy was associated with modest improvements in pain and function at up to 6 weeks, with transient minor musculoskeletal harms. However, heterogeneity in study results was large.

Key Points

Question Is the use of spinal manipulative therapy in the management of acute (≤6 weeks) low back pain associated with improvements in pain or function?

Findings In this systematic review and meta-analysis of 26 randomized clinical trials, spinal manipulative therapy was associated with statistically significant benefits in both pain and function, of on average modest magnitude, at up to 6 weeks. Minor transient adverse events such as increased pain, muscle stiffness, and headache were reported in more than half of patients in the large case series.

Meaning Among patients with acute low back pain, spinal manipulative therapy was associated with modest improvements in pain and function and with transient minor musculoskeletal harms.

From the FULL TEXT Article:

Introduction

Back pain is among the most common symptoms prompting patients to seek care. Lifetime prevalence estimates of low back pain exceed 50%. [1] Many treatments are used for acute back pain. None of the therapies for acute back pain has been established as superior to others. Treatments include analgesics, muscle relaxants, exercises, physical therapy modalities, heat, spinal manipulative therapy (SMT), and others. [2]

There have been multiple systematic reviews on spinal manipulation. A 2003 review concluded SMT was associated with statistically significant benefits compared with a sham manipulation, but not compared with other effective treatments for acute low back pain. [3] Since then, the most recent Cochrane review on the subject concluded that SMT was not associated with statistically significant benefits comparedwith other interventions or sham SMT, [4] but another Cochrane review of “combined chiropractic interventions” (which included SMT as part of the intervention) concluded the opposite. [5] A third review assessed SMT for patients with back pain of less than 3 months duration and concluded it was associated with benefits compared with placebo treatment, no treatments, or massage, [6] and a fourth review concluded “the efficacy of manipulation for patients with acute or chronic low back pain remains unconvincing.” [7]

As new trials continue to be published, [8–13] and given these differences in conclusions among studies, this review was conducted to provide updated estimates of the effectiveness and harms associated with spinal manipulation compared with other nonmanipulative therapies for adults with acute low back pain.

Methods

This systematic review is reported according to Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines. A formal protocol was developed and submitted to PROSPERO (CRD42015017916). This review is part of a larger review commissioned by the Department of Veterans Affairs.

Data Sources and Searches

MEDLINE, the Cochrane Database of Systematic Reviews, EMBASE, and Cumulative Index of Nursing and Allied Health Literature were searched (for the full search strategy, see the eAppendix in the Supplement). The initial search was for existing systematic reviews (from January 1, 2011, through May 7, 2015). References were retrieved from these. An updated search was performed (through February 6, 2017) to identify recently published studies, both systematic reviews and randomized clinical trials (RCTs). Experts were consulted for additional studies.

Study Selection

Titles, abstracts, and full-text articles were screened independently by 2 reviewers (N.M.P. and P.G.S.), with discrepancies discussed with the research group. We used the following inclusion criteria. Participants were adults with acute (defined as ≤6 weeks) lower-back pain. Studies that included a subset of patients with sciatica or leg pain were eligible, but studies exclusively about patients with sciatica were excluded. Studies of patients with chronic back pain were excluded, as were studies in which we could not determine the duration of pain. If studies included patients with longer durations of pain, we included them if they presented stratified results or if the majority of patients had pain for up to 6 weeks duration. The intervention was spinal manipulation by any type of clinician. Studies in which SMT was given alone or as part of a “package” of therapies were included. Chiropractic care was considered as including SMT. The comparator included other forms of management for acute pain, such as analgesics, exercises, physical therapy. Sham-controlled studies were included. The primary outcomes were pain and functional status. Studies had to report at least 1 outcome within 6 weeks to be eligible. Only studies in ambulatory or outpatient settings were included; studies in hospital settings were excluded. Only RCTs were eligible for assessing benefits. Both RCTs plus observational studies were used for assessing harms.

Data Extraction and Quality Assessment

Data were extracted by 2 reviewers (N.M.P. and P.G.S.), and discrepancies were reconciled after discussion. Data abstracted included the authors’ description of the SMT, type of professional performing the treatment, co-interventions, whether SMT was provided alone or as part of a package, whether patients were selected as more likely to respond to SMT or unselected, data on the outcomes listed above, and data needed to complete the Cochrane Back and Neck (CBN; formerly the Cochrane Back Review Group) Risk of Bias assessment.

Based on the authors’ description of the SMT provided, studies were categorized as using a thrust or nonthrust technique. Thrust was defined as high-velocity, low-amplitude technique, such as “a short-lever, high-velocity thrust.” Nonthrust was defined as other manual therapies that were self-described as SMT but did not meet the definition of thrust, such as a study where “most participants had several low-velocity mobilization techniques.” In 1 case, an original author was contacted to clarify whether the intervention was thrust or nonthrust.

Outcome data were extracted by the project statistician from results identified by the research team clinicians and checked by a reviewer (P.G.S.). We assessed outcomes at 2 time points. Based on a prior review on use of epidural steroids, outcomes at 2 weeks or less were defined as immediate-term and outcomes from 3 to 6 weeks were defined as short-term.

For continuous outcomes, the sample size, mean, and SD were extracted for each SMT group and comparator group within each trial. For count data, the number and percentage of patients with an event were extracted.

Study quality was assessed using the CBN Risk of Bias tool. This tool has 11 items in the following domains: randomization, concealment, baseline differences, blinding (patient), blinding (care provider [blinding of the care provider is a specific quality metric used by the CBN Risk of Bias tool]), blinding (outcome), co-interventions, compliance, dropouts, timing, and intention to treat. Prior research has shown the CBN Risk of Bias tool to identify studies at an increased risk of bias using a threshold of 5 or 6 as a summary score.

Main Outcome Measures

The a priori primary outcomes were pain, function, quality of life, and harms. Secondary outcomes included opiate use, disability claims, return to work, and health care utilization. Data were sparse for quality of life and all secondary outcomes and are not reported here. These data are included in our Evidence Report. Outcomes had to be measured within 6 weeks.

Data Synthesis and Analysis

Studies were pooled within outcome measures and 95% CIs were constructed: studies using a 100-mm visual analog scale (VAS), 11-point numeric rating scale (NRS), or other numeric pain scale were pooled by converting all outcomes to a 0-to-100 measure (using the appropriate multiplier); studies reporting the Roland-Morris Low Back Pain and Disability Questionnaire (RMDQ; range, 0-24) and studies reporting the Oswestry Disability Index (ODI; range, 0-100) were pooled as a functional outcome using an effect-size approach. Studies reporting none of these were not pooled, but discussed narratively.

Random-effects meta-analyses were conducted using the Hartung-Knapp-Sidik-Jonkman method. Tests of heterogeneity were performed using the I2 statistic. All meta-analyses were conducted with Stata statistical software (StataCorp), version 12.0, and R (R Foundation), version 3.2.2. The Begg rank correlation and Egger regression asymmetry test were used to examine publication bias. To further explore possible sources of heterogeneity (ie, timing, outcome, type of practitioner, and type of manipulation), bivariate meta-regressions were conducted.

The meta-analyses were organized based on 2 follow-up times and the 2 outcomes. Outcomes for 2 studies were in the period between immediate-term and short-term outcomes; they were closest to the definition of immediate-term, so they were classified in the immediate-term group. Within these 4 groupings the intervention was assessed in comparison with control interventions classified as either sham SMT or all other therapies. This classification was justified because many of the comparison interventions were intended to be inactive (ie, detuned diathermy, light massage) or of uncertain effectiveness (usual medical care); and for those comparisons for which the other treatment was expected to be effective, the existing RCTs and systematic reviews indicate the benefit was small, at best. Studies comparing SMT with sham SMT were not pooled with studies comparing SMT with other therapies. Studies were included in each pooled analysis only once.

An a priori analysis considered 3 potential sources of heterogeneity: the comparison group, the outcome, and the timing of the outcome. In addition, 3 post hoc hypotheses were developed to test possible explanations for observed heterogeneity: by type of manipulation, comparing thrust techniques with nonthrust techniques; by the types of patients enrolled (selected or not selected); and by study quality, comparing higher-quality trials with lower-quality trials.

The Intervention

Spinal manipulative therapy is a term that encompasses a large variation in the type of manual therapy. Direct evidence that different kinds of manipulation have different efficacy is lacking. However, among patients meeting a clinical prediction rule for SMT, thrust-type manipulation may be more effective than nonthrust-type manipulation. Therefore the intervention used in each study was classified as either thrust-type SMT or nonthrust-type SMT. Seven studies were not included because either the SMT could not be classified or the studies could not be included in the pooled analyses.

The Patients

Each study was examined to see if the authors reported having selected patients based on certain a priori criteria they believed made patients more likely to benefit from SMT.

Study Quality

Using the CBN Risk of Bias tool, studies were classified as higher quality (6-11 points) or lower quality (0-5 points), and results were compared between the 2 quality categories.

Rating the Body of Evidence

The evidence was assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria, which uses the domains of study design limitations, inconsistency, indirectness, and imprecision in results.

Results

Description of the Evidence

Figure 1

From the searches for systematic reviews and new trials, 40 articles were identified relevant to effectiveness, and 8 additional articles relevant to adverse events (Figure 1). Twenty-six RCTs were included in the data synthesis for effectiveness (for details, see the evidence table in eTable 1 in the Supplement). Of the 14 articles not included in the analyses, 3 focused on the subpopulation of patients with sciatica, 2 were only relevant to clinical prediction rule evaluations, 2 did not have the necessary outcome data, and 1 had a unique patient population (pelvic joint dysfunction) that we judged as clinically dissimilar to the other studies. The findings of the final 6 publications have been reported in another included publication.

SMT was provided by physical therapists in 13 studies, chiropractors in 7 studies, medical doctors in 5 studies, and osteopathic physicians in 3 studies. These were not mutually exclusive, because some studies employed multiple disciplines.

The most commonly met quality criteria were the timing criterion (25 studies) and the appropriate randomization criterion (17 studies). None of the studies met the criterion for blinding of providers. Only 4 studies met the criterion for blinding of patients. Twelve studies were classified as high quality and 14 studies were classified as low quality (eTable 2 in the Supplement).

Association With Pain

Figure 2

Twenty studies reported pain outcomes for comparisons of SMT with other treatments, 17 immediate-term and 18 short-term outcomes. Fifteen studies reported outcomes using a 100-mm VAS, or 11-point NRS, or other numeric pain scale and were included in pooled analyses (1,711 patients). As differences in relative effectiveness between immediate-term and short-term outcomes were small, only the pooled result with the largest number of patients is presented in Figure 2 (short-term pain, with 12 RCTs and 1,335 patients). The overall random-effects pooled estimate for short-term pain was a mean effect of –9.95 mm (95% CI, –15.6 to –4.3), favoring treatments with SMT compared with other treatments. (Figure 2). There was heterogeneity in the results (I2 = 67%). For immediate-term pain, the overall random-effects pooled estimate was –9.76 mm (95% CI, –17.0 to –2.5) compared with other treatments. A sensitivity analysis substituting the alternative comparison group (back school instead of diathermy) in the 3-group study by Bergquist-Ullman and Larsson yielded a result similar to the main analysis (–8.22 mm [95% CI, –14.7 to –1.7]). Two studies of SMT vs sham SMT reported nonstatistically significant results. There was no evidence of publication bias in the overall pooled result, with a Begg rank correlation of 0.92 and an Eggar test P value of .58.

Studies Not Included in the Pooled Analysis

Five studies reported outcomes that were not measured with a 100-mm VAS, NRS, or other numeric pain scale. All were old studies (30-40 years ago), and all but 1 were judged as low quality. Two of the 5 studies concluded SMT had an effect and 3 studies concluded it did not.

Association With Function Outcomes

Figure 3

A total of 17 studies reported functional outcomes for comparisons of SMT with other therapies, 15 immediate-term and 11 short-term outcomes. Eight studies measured function using the RMDQ, and 4 studies used the ODI (1,381 patients). As differences in relative effectiveness between immediate-term function and short-term function were small, only the pooled result with the largest number of patients (short-term function, with 8 RCTs and 975 patients) is presented in the Figure 3. The overall random-effects pooled estimate for short-term function was an effect size of –0.39 (95% CI, –0.71 to –0.07) favoring treatment with SMT (Figure 3). There was heterogeneity in the results (I2 = 72%). For immediate-term function, the overall random-effects pooled estimate was an effect size of –0.24 (95% CI, –0.55 to 0.08). A sensitivity analysis substituting the alternative comparison group (physical therapy instead of booklet) in the 3-group study by Cherkin and colleagues yielded a result similar to the main analysis (–0.32 [95% CI, –0.65 to 0.02]). Two small studies of SMT vs sham SMT reported small- to medium-sized effects but neither was statistically significant. There was no evidence of publication bias, with a Begg rank correlation of 0.85 and an Eggar test P value of .10.

Studies Not Included in the Pooled Analysis

Five studies did not report function outcomes using the RMDQ or ODI. With 1 exception, all the studies were performed more than 20 years ago. Three studies were judged as high quality and 2 studies were low quality. Three studies concluded SMT had an effect compared with usual medical care, advice to stay active, or advice on posture, exercises, and avoidance of occupational stress, and 2 studies concluded it did not.

Exploring Sources of Heterogeneity

Meta-regression did not show any statistically significant differences in association by timing, outcome, type of manipulating clinician, or whether SMT was delivered alone or with other interventions. Differences in pooled effects between patients receiving thrust compared with nonthrust SMT were not statistically significant. However, in 3 of the 4 comparisons the pooled effect size for thrust-type manipulation was about twice as large as the pooled effect size for nonthrust manipulation, or the effect size of individual RCTs of nonthrust therapy. Five studies reported having selected patients based on an increased probability of response to SMT, but 4 were a set of similar studies (discussed below) and no conclusions were drawn from the 1 remaining study. Both meta-regression and stratified analysis showed no statistically significant differences between groups based on study quality.

Studies Considered Separately Because of Shared Characteristics

Four studies meeting all eligibility criteria were not included in the pooled analysis because they all shared some common characteristics:

(1) all used a similar method to select patients considered more likely to benefit from a specific kind of manual therapy;

(2) all used the same SMT technique;

(3) all studies were authored by professionally related physical therapists;

(4) three of these studies reported the largest effect sizes for their primary outcome, short-term function (more than 3 times greater than the average for other SMT studies).

Because all of these studies shared some common characteristics and because including them in the pooled analysis greatly increased both heterogeneity and the size of the effect, they were most appropriately discussed as their own group.

The first 2 studies were authored by the same group of researchers, were small (24 patients in each), were classified as low quality, and reported large benefits in favor of the patients receiving the SMT. The third study was a randomized trial of a clinical prediction rule to identify patients most likely to benefit from SMT, and classified as high quality. Based on prior work that used a prospective cohort to identify variables, the authors proposed 5 criteria — any 4 of which identified a patient as more likely to benefit from SMT: duration of episode less than 16 days, no symptoms radiating below the knee, less than 19 points on the Fear-Avoidance Beliefs Questionnaire work subscale, and 2 physical findings. Among patients who met criteria for likely to respond to SMT, those patients treated with SMT had a large benefit in function at 1 week compared with those patients not treated with SMT.

A fourth RCT reported results from participants selected using a similar clinical prediction rule and treated with the same type of thrust manipulation. Although this study found statistically significant benefits in both pain and function in patients treated with SMT, the size of the benefit was smaller than in the prior 3 studies. This discrepancy was attributable to better outcomes in the patients not treated with SMT in this study compared with the prior 3 studies.

Harms

Table 1

Table 2

SMT for Acute Low Back Pain In the 26 RCTs of SMT for acute low back pain included in the pooled analyses, 18 publications did not describe assessment of harms, 3 publications made nonspecific comments about harms (ie, no adverse effects were documented), and 5 publications reported on specific harms (Table 1), none of which were considered related to the treatment except that “the treatment hurts” was statistically more common in the group of patients receiving SMT (along with other interventions) compared with those receiving conventional medical care.

SMT in General Eight studies prospectively assessed harms in patients receiving SMT. Harms were typically assessed by asking consecutive patients receiving SMT from a sample of manual therapy clinicians to complete a questionnaire. Results of these studies, which ranged from 68 to 1058 patients, were generally consistent. Mild, transient harms were reported by 50% to 67% of patients. The most commonly reported adverse effects were local discomfort or increased pain (Table 2). In 1 randomized trial focused on SMT harms, although approximately 50% of patients receiving SMT reported harms, this was not statistically different than the proportion reporting harms in patients randomized to receive manual therapy without SMT or manual therapy without stretching exercises. No serious harms were reported in any of these studies.

Serious Harms Numerous case reports, collections of case reports, and systematic and nonsystematic reviews have included discussion of serious harms of SMT in general and of SMT for low back pain. However, these case reports could not assess causality or calculate incidence and results of these case reports were not included in this review.

Grading the Quality of Evidence

The quality of evidence was judged as moderate that treatment with SMT was associated with improved pain and function in patients with acute low back pain, which was downgraded from high due to inconsistency of results.

The quality of evidence was judged as high that SMT is commonly associated with transient minor musculoskeletal harms, although they may be equally common following non-SMT manual therapy.

Discussion

The principal conclusion of this review was that SMT treatments for acute low back pain were associated with statistically significant benefit in pain and function at up to 6 weeks, that was, on average, clinically modest. The size of the benefit for pain (–9.95 mm) is about the same as the benefit for nonsteroidal anti-inflammatory drugs in acute lowback pain (–8.39 mm) according to the Cochrane review on this topic. [27] For function, the effect size of –0.39 is approximately equivalent to an improvement in the RMDQ score of between 1 and 2.5 points, using the range of SDs for the RMDQ in the included studies. However, heterogeneity was high, and could not be explained by differences in patients, clinicians, type of manipulation, study quality, or timing of the outcome. Evaluation of these differences was limited by the quality of reporting in the primary studies.

This review adds to the existing literature by including a greater number of eligible RCTs in the pooled analysis than prior reviews, and also providing a higher level of precision to the pooled analysis. For example, 2 prior reviews included 37 and 45 RCTs and did not perform a pooled analysis. Another review included 27 studies, [6] but patients could have had pain for up to 3months’ duration, and it is unclear howmany RCTs were included in their pooled analysis and whether or not they pooled sham-controlled studies with active therapy comparisons. The most recent Cochrane review on SMT for acute low back pain reports pooled results for pain and function at 4–week follow-up that included only 3 studies for each outcome. [4] In the current review, 10 studies for pain and 6 studies for function were included in pooled analyses for short-term outcomes.

The studies reporting the largest benefits were 3 studies that used clinical criteria to select patients as more likely to benefit. [32–34] In a recent RCT, the physical therapy research team reported statistically significant benefits of much smaller magnitude. [9] Possible hypotheses include that the comparison group (usual care along with education and reassurance based on The Back Book) was more effective than the exercises given to the comparison groups in the prior studies or that it is due to patient selection, as the most recent study recruited patients directly from primary care and not from patients already referred to physical therapy (and therefore possibly having less successful spontaneous improvement). The recent study also selected patients using a modification of the prediction rule that is more pragmatic for clinical implementation but is known to sacrifice specificity in identifying likely SMT responders.

Limitations

This study has limitations. First, there were limitations in the quantity and quality of the original research. More studies were classified as low quality than high quality. Nevertheless, high quality studies tended to report larger benefits. Second, some studies did not describe the manipulation in sufficient detail to allow application in practice. Third, there was significant unexplained heterogeneity. There were too few studies to use meta-regression methods to simultaneously test for variables possibly associated with heterogeneity. The most fruitful area for further research is likely to be assessing the role of patient selection and type of SMT on explaining heterogeneity in treatment effects. Fourth, the minimum clinically important difference for these outcomes has not been well established, raising questions about the size of the clinical benefit. Fifth, the possibility of publication bias exists, although no statistical evidence for it was detected.

Conclusions

Among patients with acute lowback pain, spinal manipulation therapy was associated with modest improvements in pain and function at up to 6 weeks, with transient minor musculoskeletal harms. However, heterogeneity in study results was large.

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