**Brantingham JW, Cassa TK, DC, Bonnefin D, and et al. Manipulative and multimodal therapy for upper extremity and temporomandibular disorders: a systematic review. J Manipulative Physiol Ther 2013; 36:143-201.**

**PMID: 23697915**

**Design:** Systematic review of randomized clinical trials

**Date:** 11-19-15 LM

**Study Question:** To determine whether manual and manipulative therapy (MMT) is an effective chiropractic treatment with or without multimodal therapy for a variety of upper extremity conditions particularly, lateral epicondylitis (LE), carpal tunnel syndrome (CTS), and thumb osteoarthritis (OA).

**PICOs:**

* **Patients:** Participants 18 years of age or over with an extremity peripheral diagnosis for upper extremity problems including the elbow, wrist, hand, and finger.
* **Interventions:** Chiropractic manual and manipulative therapy and mobilizations (MMT), with or without adjunctive multimodal therapy, such as exercise or rehabilitation, NSAIDs, soft tissue and myofascial technique, stretching, strengthening, proprioceptive neuromuscular facilitation, splinting or orthoses, electro-modalities, heat, ice, nutrition, advice and other adjunctive modalities.
* **Comparison interventions:** The control group could be a no treatment placebo group, another treatment usually a standard treatment, or both.
* **Outcomes:** Various assessments of pain, function, grip strength, self-reported physical distress, and other measures using a variety of scales.
* **Study types:** Randomized controlled or clinical trials (RCTs) or controlled clinical (quasi-randomized) trials (CTs) comparing some form of MMT to a group not receiving MMT.

**Study selection:**

* Databases included the Cumulative Index of Nursing Allied Health Literature (CINAHL), PubMed, Manual, Alternative, and Natural Therapy Index System (MANTIS); Physiotherapy Evidence Database (PEDro); Index to Chiropractic Literature, Google Scholar, and a hand search of literature dating from January 1983 to March 5, 2012.
* Relevant articles were read, reviewed and assessed for quality, and data were abstracted independently by a minimum of 3 of the authors using the valid and reliable Physiotherapy Evidence Database scale or PEDro ranking system. The PEDro methodological scores of RCTs are ranked from “10 best,” to“0 worst.” The mean PEDro score from all authors was decided by group consensus.
* A more rigorous, slightly modified PEDro ranking system was used in this review: a very high-quality RCT is a score of 9 to 10 with a very low risk of bias, a high-quality RCT is 7 to 8 with low risk of bias, a moderate quality is 4 to 6 with a high risk of bias, and low-or poor-quality RCTs are rated 1 to 3 with very high risk of bias.
* The strength of the evidence for each upper extremity condition was then given a Grade as either a level A, B, C, or I for insufficient. Grade A was considered good evidence from relevant studies, Grade B was fair evidence, Grade C was limited evidence from studies and reviews, and I for no recommendation because of insufficient or non-relevant evidence.
* The results of the various RCTs were not pooled and meta-analyses were not conducted.

**Results:**

* Out of 81 randomized controlled or clinical trials, 35 were included in this review and used to develop expert consensus. Five controlled or clinical trials were located and 4 were included. Thirty-two case series and reports were included in the review, but are not included in this critique.
* Of the 35 RCTs included and ranked on the PEDro quality system, 20 RCTs scored a 6 or higher on the PEDro scale; 4 RCTs ranked a score of 8, 10 RCTs scored a 7, 6 RCTs scored a 6, and the remaining 15 RCTs scored below 6 on the PEDro ranking system. There were no very high quality RCTs scoring a 9 or 10, just 14 high quality RCTs, and the remaining 21 RCTs of low or medium quality. Only the 20 RCTs that scored > 6 on the PEDro scale were considered in this review.
* There is a fair or Grade B level of evidence for MMT for short-term treatment of ≤3-6 months for LE to the elbow joint and/or full kinetic chain (FKC) generally combined with exercise, soft tissue and/or myofascial treatment, advice, education, and home exercise also known as multimodal therapy. Evidence level was based on MMT randomized controlled or clinical studies combined with exercise and/or multimodal therapy including 8 high quality RCTs (PEDro scores of 7 or 8), and 3 medium quality RCTs ranking a 6.
* In 2 high quality RCTS for LE, 8 or 9 MMT treatments over 3 weeks produced an 11 point mean decrease in VAS pain scores. At the end of 6 weeks of treatment in one study, the mean VAS scores decreased 26 points. Multimodal therapies with MMT were used in both studies, and included extensive exercise, ultrasound, deep friction massage, and soft tissue mobilization. Combining elbow manipulation and exercise was superior to wait and see in the first 6 weeks, and to steroid injections in the long term (at 3, 6, and 12 months). In one high quality study, function improved from baseline to 6 weeks by 1.6 kilograms in pain free grip strength.
* In these same 2 high quality RCTS for LE, corticosteroid injection achieved the quickest, highest levels of VAS pain relief and improved functional outcomes in the short-term, but by 12 weeks corticosteroid injection was not superior to MMT in either study. MMT with physical therapy or exercise achieved significantly superior long-term outcomes for a greater number of subjects in both studies. Approximately one-half (or more) of the steroid subjects improved, but in both studies approximately one-third to one-half of all subjects that received steroid injections relapsed to a near complete or a complete relapse, not simply a diminished improvement as seen in the MMT groups.
* There is a fair or Grade B level of evidence for MMT, particularly soft tissue/myofascial MMT to the wrist and/or carpal bone mobilization for short-term treatment of ≤3-6 months for Carpal Tunnel Syndrome or CTS combined with multimodal therapy including splints, ultrasound, advice, and education on modification of activities of daily living. Evidence level was based on MMT combined with exercise and/or multimodal therapy which included 2 high quality RCTs (PEDro score of 7), and 5 medium quality RCTs (PEDro score of 6). Average length of treatment was 5 to 6 weeks for a total of 10 treatments.
* There is Insufficient or Grade I level of evidence for MMT combined with multimodal treatment for the wrist, hand and finger disorders such as thumb osteoarthritis and De Quervains' tenosynovitis. There are so very few RCTs covering wrist, hand and finger conditions to allow a statement of evidence beyond insufficient.

**Authors’ conclusions:**

* A combination of MMT and/or soft tissue MMT, such as transverse friction massage plus multimodal care which includes a continued and extensive home exercise program, education, self-mobilization, and advice on how to limit aggravations appears to deliver the best short and long-term outcomes for pain and functional relief for LE, more than any short-term delivery of manipulative or manual therapy and/or exercise protocol.
* For the short-term treatment of carpal tunnel syndrome, manual and gentle manipulative therapy or carpal bone mobilization combined with wrist splinting, ultrasound, and other multimodal care, advice, and exercise appears a reasonable first choice as best practice, evidenced-based care that is effective, and used before steroid injection, a secondary line of conservative care and surgery, if these fail or there is severe neurological and/or functional degeneration. Carpal bone mobilization and soft tissue MMT may decrease mechanical pressure and/or entrapment of the median nerve, disperse intraneural edema, increase vascularization to the vasa vasorum relieving ischemic effects and decreasing swelling while relieving symptoms and promoting healing.
* The overall results of the review suggest that MMT with exercise and/or multimodal therapy is efficacious in terms of reduced pain and improved physical function in the short-term care (≤3-6 months) of common upper extremity neuromuscular disorders, and is comparable with other conservative or standard care (such as steroid injection).

**Comments:**

* There were marked differences between the included RCTs in the number and duration of the MMT treatments provided. For LE, the number of MMT treatments ranged from one to 12 over 2 to 6 weeks with an average of 8 treatments overall. For carpal tunnel syndrome, the number of MMT treatments ranged from one to 27 over 5 to 6 weeks with an average of 10 treatments overall. These differences in number of treatments and duration make it nearly impossible to develop recommendations for effective treatment.
* Because of the active intervention, participants were aware of their allocation status, and so none of the RCTs were able to blind participants to treatment allocation. This makes the results vulnerable to performance and detection bias. Given that the main outcomes of this review were participant self-reported pain and physical function, there is also a possibility that the treatment results may be inflated. Although there may be a potential study limitation for the evidence for pain and function (a potential for bias that may overestimate the effect sizes), it was not considered substantial enough to downgrade the evidence.
* Since MMT is rarely used as an isolated treatment intervention for both LE and CTS, but is instead generally combined with multimodal therapy, especially exercise or physical therapy, it is difficult to discern if the addition of MMT produces effectiveness beyond using multimodal therapy alone.
* In 2 high quality RCTS for LE, 8 or 9 MMT treatments over 3 weeks produced an 11 point mean decrease in VAS pain scores. At the end of 6 weeks of treatment in one study, the mean VAS scores decreased 26 points. The minimal clinically important difference (MCID) for VAS pain scores is determined to be 17 points. The difference in pain reduction after 3 weeks of treatment of 11 points did not attain clinically important results overall. However, these small clinically insignificant benefits seen here still could be considered a clinically important benefit for a low risk intervention such as MMT and exercise.
* Future studies should explore the effect of strategies to improve exercise adherence in this population. A larger number of multi-armed randomized studies would allow for meaningful subgroup analyses to help provide evidence for optimal MMT content, protocols, and dosage. In addition, future research should assess the long-term effectiveness of MMT for people with carpal tunnel syndrome in terms of disease progression and time to CTS release surgery.

**Assessment:**

* Adequate quality systematic review which supports good evidence that manual and manipulative therapy combined with exercise and/or multimodal therapy shows small, clinically important reductions in pain and improved physical function in the short-term care (≤3-6 months) of patients with lateral epicondylitis and carpal tunnel syndrome.