

CHIROPRACTIC NEUROLOGY RESEARCH BRIEF

A QUARTERLY NEWSLETTER FOR HEALTH CARE PROFESSIONALS BY MARK SARACINO, DC, DACAN

VOLUME THREE

ISSUE ONE

Chiropractic Manipulation and Low Back Pain

Introduction

In the last two decades, chiropractic manipulative treatment has gained more attention because of the scientific evidence supporting its effectiveness for low back pain. At least 43 randomized controlled trials of spinal manipulation have been performed for acute, sub-acute and chronic low back pain. Thirty of these studies favor spinal manipulation over comparison treatments. Only 13 studies have found no significant difference and not one study has found spinal manipulation to be statistically or clinically less effective than the comparison treatment. (1) Chiropractic manipulation is perhaps the most studied treatment intervention for low back pain.

Government-sponsored studies in the United States, Canada and New Zealand have recommended spinal manipulation for the treatment of low back pain. (2-4) In 1994, the Agency for Health Care Policy and Research, a division of the U.S. Department of Health and Human Services, appointed a panel of experts to review over 3,000 studies on treatments for acute low back pain. After their review of the literature, spinal manipulation was one of the recommended treatments for acute low back pain. (2)

Results

There are studies that show that chiropractic manipulation has benefits beyond short-term pain relief. In a randomized controlled trial comparing chiropractic and hospital outpatient treatment of low back pain, the authors concluded that chiropractic treatment was more effective than hospital outpatient management, especially for patients with chronic or severe pain. (5)

At the three-year follow-up, the chiropractic group had a 29 percent improvement in Oswestry (disability) scores in comparison to the hospital group. (6)

Another randomized controlled trial of 256 patients with non-specific back and neck complaints received spinal manipulation, physiotherapy (exercises, massage, heat, electrotherapy, ultrasound, shortwave diathermy), treatment by a general practitioner (analgesics, NSAIDs, advice about posture, home exercises, and bed rest), or placebo (detuned shortwave diathermy and ultrasound). The study found that manipulation and physiotherapy were superior to the general practitioner and placebo groups. However, at 12-month follow-up, the manipulation group demonstrated greater improvement in the main complaint and physical functioning compared to physiotherapy. (7)

A 1998 *New England Journal of Medicine* study compared chiropractic manipulation, physical therapy (PT) and an educational pamphlet for the treatment of low back pain. The authors concluded that chiropractic and physical therapy showed little benefit compared to the educational pamphlet. However, a closer inspection of the data found that the chiropractic group had subjects who were worse in terms of their history of back pain, pain levels, and risk factors for poor outcome. In spite of these unmatched baseline characteristics, the chiropractic group fared better in terms of pain and disability at both the four and 12 week follow-up. The chiropractic subjects also reported a significant decrease in the use of pain medication compared to the other groups (82 percent to 18 percent in the chiropractic group, 84 percent to 27 percent in the PT group, and 77 percent to 32 percent in the pamphlet group). At 11-month follow-up, the authors stated that a smaller percentage of the chiropractic subjects had lost time from work, the need for bed rest, and limited activity due to pain compared to the PT and pamphlet groups. (8)

Finally, a randomized controlled trial of one hundred fifteen patients with chronic spinal pain (greater than 13 weeks duration) were assigned to receive either NSAIDs (Celebrex, Vioxx, or paracetamol), acupuncture or chiropractic manipulation twice a week for nine weeks (9).

By the end of the study, chiropractic manipulation achieved the best overall results. The chiropractic group had the highest proportion of patients that received early complete relief (27.3 percent) compared to acupuncture (9.4 percent) and medication (5 percent). The chiropractic group had a 50 percent improvement in back pain intensity compared to acupuncture (15 percent) and medication (0 percent). In addition, neck and back ranges of motion were dramatically increased in the patients who received manipulation. One of the study's most remarkable findings was the chiropractic group reported a 47 percent improvement in overall health compared to only 15 percent for the acupuncture group and 18 percent for the medication group. This is the third study to show chiropractic improves overall health as a result of improved spinal function and range of motion.

Another interesting finding was the fact that the chiropractic patients had the highest average duration of chronic pain (8.3 years) versus 6.4 years in the acupuncture group and 4.5 years in the medication group. This makes the effectiveness of chiropractic manipulation even more impressive compared to other treatments.

These studies clearly indicate that patients can receive long-term benefits from chiropractic manipulation.

There are a number of reasons why patients receiving chiropractic manipulation have excellent outcomes. One of the many positive effects of chiropractic manipulation is the modulation of pain. It has been shown that manipulation of zygapophyseal joints not only causes a decrease of paraspinal hyperalgesia in subjects with symptoms, but also an increase in paraspinal pain thresholds to noxious stimuli in subjects with no symptoms. (10-13) It is believed that the stimulation of joint mechanoreceptors (through

manipulation) has an inhibitory effect on second order neurons in the dorsal horn of the spinal cord. (14) These second order neurons are the same neurons that transmit nociception to higher brain centers.

Research

Recent research has also confirmed that chiropractic manipulation can stimulate muscle reflex responses. (15-18) Colloca et al.(17), found that the reflexes generated are consistent (in 95 percent of subjects) and the reflexes arise from the mechanical stimulation of discoligamentous and muscular afferent nerve fibers. Herzog et al.(16) states: "Because reflex pathways are evoked systematically during spinal manipulative treatment, there is a distinct possibility that these responses may cause some of the clinically observed beneficial effects, such as a reduction in pain and a decrease in hypertonicity of muscles."

Another recent study investigated the effects of paraspinal muscle strength following spinal manipulative therapy (SMT). Forty subjects were assessed for trunk muscle strength by performing maximum voluntary contraction (MVC) isometric trunk extension while lying prone on a treatment table. The subjects were then divided and received instrument-assisted SMT, sham manipulation or neither (control). The study found that SMT results in a significant increase in sEMG erector spinae isometric MVC muscle output. The subjects' trunk muscle strength increased 21 percent after receiving SMT. (19)

Improved spinal kinematics is another positive effect of chiropractic manipulation. Several studies have shown that manipulation can increase spinal ranges of motion. (20-24)

In the field of orthopedics, more attention has been paid to lumbar sagittal balance as it relates to low back pain and post-surgical outcomes. It has been shown that patients who have better lumbar sagittal balance following lumbar fusion have better post-surgical outcomes. (25)

In the chiropractic field, conservative methods have been developed to improve the lordosis and sagittal balance of low back pain patients. There is a new, non-surgical method of lumbar extension traction that has been shown to increase the lumbar lordosis in chronic low back pain patients with hypolordosis. (26) Forty-eight consecutive patients with chronic low back pain were matched for sex, age, height, weight, and pain scores with 30 control subjects. The treatment group received lumbar spinal manipulation in the first few weeks for short-term pain relief. They then received a session of 3-point bending lumbar extension traction three to four times per week for 12+/-4 weeks. Pain scores (VAS) and radiographic measurements did not change in the control group. In the traction group, VAS scores decreased from a mean +/-standard deviation of 4.4+/-1.9 to 0.6+/-0.9.

Radiographic measurements showed improvements that were statistically significant. Mean changes in lordotic angles were 5.7 degrees at L4-5, 11.3 degrees between

posterior tangents on L1 and L5, 9.1 degrees in Cobb angle at T12-S1, and 4.7 degrees in Ferguson's sacral base angle. Seventy-one percent (34 of 38) of the subjects were evaluated for long-term follow-up (17.5 months). The improved lumbar lordosis was maintained in all 34 subjects. This chiropractic method of lumbar extension traction is the first conservative procedure to increase the lordosis in chronic low back pain patients. Furthermore, the structural corrections appear to be permanent.

Discussion

Improving the structural alignment of the spinal column is the ultimate goal of chiropractic treatment. Improving structural alignment balances the loads, stresses and strains on spinal tissues. This, in turn, improves spinal biomechanics and results in the reduction or elimination of pain.

The research supporting chiropractic manipulation is mounting. Because chiropractic has been found to be an effective treatment for low back pain in numerous studies, it should be the treatment of choice for patients with both acute and chronic low back pain.

REFERENCES

1. Meeker WC, Haldeman S. Chiropractic: a profession at the crossroads of mainstream and alternative medicine. *Annals Internal Medicine* 2002; 136:216-27.
2. Bigos S, et al. Acute low back problems in adults. Clinical practice guideline no. 14. AHCPR Pub No. 95 – 0624. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Dept. of Health And Human Services. December 1994.
3. Manga P. The effectiveness and cost effectiveness of chiropractic management of low back pain. Ottawa, Ontario, Canada. Ontario Ministry of Health 1993.
4. Chiropractic in New Zealand. Report of the Commission of Inquiry. Wellington, New Zealand: PD Hasselberg, Government Printer, 1979.
5. Meade TW et al. Low back pain of mechanical origin: randomized comparison of chiropractic and hospital outpatient treatment. *British Medical Journal* 1990; 300: 1431-37.
6. Meade TW et al. Randomized comparison of chiropractic and hospital outpatient management for low back pain: results from extended follow-up. *British Medical Journal* 1995; 311: 349-51.
7. Koes BW et al. Randomized clinical trial of manipulative therapy and physiotherapy for persistent back and neck complaints: results of one year follow-up. *British Medical Journal* 1992; 304:601-605.
8. Cherkin DC et al. A comparison of physical therapy, chiropractic manipulation and provision of an educational booklet for the treatment of patients with low back pain. *New England Journal Medicine* 1998; 339: 1021-29.
9. Giles LG, Muller R. Chronic spinal pain: A randomized clinical trial comparing medication, acupuncture, and spinal manipulation. *Spine* 2003; 28:1490-1502.
10. Hsieh J, Hong CZ. The effect of chiropractic manipulation on the pain threshold of myofascial trigger points: a pilot study. In: Wolk S, editor. *Proceedings of the 1990 International Conference on Spinal Manipulation*. Foundation for Chiropractic Education and Research, Washington D.C.; 1990.
11. Vernon HT et al. Pressure pain threshold evaluation of the effect of spinal manipulation in the treatment of chronic neck pain: a pilot study. *Journal Manipulative Physiological Therapeutics* 1990; 13:13-6.
12. Vernon HT et al. Evaluation of neck muscles strength with a modified sphygmomanometer dynamometer: reliability and validity. *Journal Manipulative Physiological Therapeutics* 1992; 15:34-9.
13. Terret ACJ, Vernon HT. Manipulation and pain in tolerance: a controlled study of the effect of spinal Manipulation on paraspinal cutaneous pain tolerance levels. *American Journal Physical Medicine* 1984; 63: 217-25.
14. Vernon HT. Qualitative review of studies of manipulation-induced hypoalgesia. *Journal Manipulative Physiological Therapeutics* 2000; 23: 134-8.
15. Pickar JG, Wheeler JD. Response of muscle proprioceptors to spinal manipulative-like loads. *Journal Manipulative Physiological Therapeutics* 2001; 24: 2-11.

16. Herzog et al. Electromyographic responses of back and limb muscles associated with spinal manipulative therapy. *Spine* 1999; 24 (2): 146-52.
17. Colloca CJ, Keller TS. Electromyographic reflex responses to mechanical force, manually assisted spinal adjustments. *Spine* 2001; 26(10): 1117-24.
18. Colloca CJ, Keller TS. Stiffness and neuromuscular reflex response of the human spine to dynamic posteroanterior manipulative thrusts in patients with low back pain. *Journal Manipulative Physiological Therapeutics* 2001; 24: 489-500.
19. Colloca CJ, Keller TS. Mechanical force spinal adjustment increases trunk muscle strength assessed by EMG: A comparative controlled clinical trial. *Journal Manipulative Physiological Therapeutics* 2000; 23: 585-95.
20. Cassidy JD et al. The effect of manipulation on pain and range of motion in the cervical spine. *Journal Manipulative Physiological Therapeutics* 1992; 15: 495-500.
21. Cassidy JD et al. The immediate effect of manipulation vs. mobilization on pain and range of motion in the cervical spine: a randomized controlled trial. *Journal Manipulative Physiological Therapeutics* 1992; 15: 570-5.
22. Hviid H. The influence of chiropractic treatment on the rotary mobility of the cervical spine. *Ann Swiss Chiropractic Assoc* 1971; 5:31-44.
23. Nilsson N et al. Lasting changes in passive range of motion after spinal Manipulation: a randomized, blind, controlled trial. *Journal Manipulative Physiological Therapeutics* 1996; 19:165-8.
24. Lehman GJ, McGill SM. Spinal manipulation causes variable spine kinematic and his trunk muscle electromyographic responses. *Clinical Biomechanics (Bristol, Avon)* 2001; 16 (4): 293-9.
25. Kawakami M et al. Lumbar sagittal balance influences the clinical outcome after decompression and posterolateral spinal fusion for degenerative lumbar spondylolisthesis. *Spine* 2002; 27 (1): 59-64.
26. Harrison DE et al. Changes in sagittal lumbar configuration with a new method of extension traction: nonrandomized clinical controlled trial. *Archives Physical Medicine Rehabilitation* 2002; 83 (11): 1585-91.

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