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Relationship Among Cavitation, Zygapophyseal Joint Gapping and Spinal Manipulation

Gregory Cramer, DC, PhD, Kim Ross, DC, PhD, Judith Pocius, MS, et al.

Objective: This project determined the feasibility of conducting larger studies assessing the relationship between cavitation and zygapophyseal (Z) joint gapping following [spinal manipulative therapy](#) (SMT).

Methods: Five healthy volunteers (average age, 25.4 years) were screened and examined against inclusion and exclusion criteria. High-signal magnetic resonance imaging (MRI) markers were fixed to T12, L3, and S1 spinous processes. Scout images were taken to verify the location of the markers. Axial images of the L4/L5 and L5/S1 levels were obtained in the neutral supine position. Following the first MRI, accelerometers were placed over the same spinous processes; and recordings were made from them during side-posture positioning and SMT. The accelerometers were removed, and each subject was scanned in side-posture. The greatest central anterior to posterior Z joint spaces (gap) were measured from the first and second MRI scans. Values obtained from the first scan were subtracted from those of the second, with a positive result indicating an increase in gapping following SMT (positive gapping difference). Gapping difference was compared between the up-side (SMT) joints vs the down-side (non-SMT) joints and between up-side cavitation vs up-side noncavitation joints.

Results: Greater gapping was found in Z joints that received SMT (0.5 ± 0.6 mm) vs non-SMT joints (-0.2 ± 0.6 mm), and vertebral segments that cavitated gapped more than those that did not cavitate (0.8 ± 0.7 vs 0.4 ± 0.5 mm).

Conclusions: A future clinical study is quite feasible. Forty subjects (30 in an SMT group and 10 in a control group) would be needed for appropriate power (0.90).

Immediate Effects of the Audible Pop From a Thoracic Spine Thrust Manipulation

Rob Sillevs, PT, DPT, PhD, MTC, Joshua Cleland, PT, PhD

Purpose: This study investigated the immediate effects of audible joint sounds following a supine

T3-T4 spinal thrust manipulation on the autonomic nervous system activity using a fully automated pupillometry system in patients with **chronic neck pain**. An additional aim was to determine if audible sounds as perceived by the therapist were associated with the reduction of pain following manipulation.

Methods: One hundred subjects with chronic neck pain completed the study protocol. The Mann-Whitney U test was used to compare the change scores of the three measuring points between the one-pop and multiple-pop groups. Subjects were randomized into either a manipulation or a mobilization group. A method of automated pupillometry was used in this study to capture pupil responsiveness.

Results: The analysis showed that there was no significant difference between the two groups ($P > .05$). The Kruskal-Wallis test was used to compare the median change scores between the mobilization, no-pop, and pop groups. The analysis showed that there was no statistically significant difference in the amount of change in pupil diameter between the three groups ($P > .05$). The Mann-Whitney U test demonstrated that the no-pop group ($P = .031$) and the multiple-pop group ($P = .014$) had a significant reduction of pain; however, it did not reach the minimal clinically significant level of 13 mm on the visual analog scale.

Conclusions: The results of this study provided evidence that the presence of joint sounds does not influence the overall activity of the autonomic nervous system following a thrust manipulation or contribute to the reduction of pain in patients with chronic neck pain.

Changes in Bending Stiffness and Lumbar Spine ROM Following Mobilization and Manipulation

Nikolaos Stamos-Papastamos, MSc, Nicola Petty, DPT, and Jonathan Williams, MManipTher

Objective: The purpose of this study was to investigate the effects of lumbar rotational manipulation and lumbar central posteroanterior mobilization on lumbar bending stiffness and flexion and extension **range of motion** (ROM).

Methods: A same-subject, repeated-measures, crossover design was used using 32 asymptomatic subjects (16 female and 16 male; mean [SD] age, 25.5 [4.5] years; weight, 65.7 [11.8] kg; and height, 1.70 [0.08] m). Each subject received mobilization or manipulation on two different occasions. Bending stiffness was calculated using a three-point bending model using an electromagnetic tracking device and a force platform; lumbar flexion and extension ROM was measured using an electromagnetic tracking device. All variables were measured pre- and postintervention. Their effect was compared using paired t tests.

Results: Manipulation and mobilization did not significantly alter either bending stiffness or lumbar flexion and extension ROM (mobilization: $P = .175$, $P = .613$, and $P = .535$; manipulation: $P = .973$, $P = .323$, and $P = .439$). Bending stiffness changes were not correlated to changes in ROM (Pearson r for stiffness-flexion = -0.102 , $P = .586$; Pearson r for stiffness-extension = 0.014 , $P = .941$).

Conclusions: Manipulation and mobilization had no significant effect on bending stiffness or flexion and extension ROM for this group of subjects. Some individual variations in effect were observed.

Exercise Therapy for Office Workers With Nonspecific Neck Pain: Literature Review

Rattaporn Sihawong, MSc, et al.

Objective: The purpose of this study was to evaluate the effectiveness of various types of exercise for prevention and cure of nonspecific neck pain in office workers.

Methods: Publications between 1980 and April 2010 were systematically searched in [various databases](#) (PubMed, CINAHL Plus with full text, The Cochrane Library, Science Direct, PEDro, ProQuest, PsycNet, and Scopus). The following key words were used: neck pain, cervical pain, exercise, strengthening, stretching, endurance, office workers, visual display unit, visual display terminal, and computer users. A hand search of relevant journals was also carried out. Relevant randomized controlled trials were retrieved and assessed for methodological quality by two independent reviewers. The strength of the evidence was based on methodological quality and consistency of the results.

Results: Nine randomized controlled trials were included in this review, of which six were rated as high-quality studies. No exercise type was identified as being effective in the prevention of nonspecific neck pain in office workers. Strong evidence was found for the effectiveness of muscle strengthening and endurance exercises in treating neck pain. Moderate evidence supported the use of muscle endurance exercise in reducing disability attributed to neck pain.

Conclusion: Literature investigating the efficacy of exercise in office workers with nonspecific neck pain was heterogeneous. Within the limitations, for treatment of neck pain, either muscle strengthening or endurance exercise is recommended, whereas for reduction of pain-related disability, muscle endurance exercise is suggested. Further research is needed before any firm conclusions regarding the most effective exercise programs for office workers can be reached.

Structure and Validity of the Modified Somatic Perception Questionnaire and Pain Beliefs Instrument

Megan Donaldson, PhD, PT, Ken Learman, PhD, PT, Alexis Wright, PT, et al.

Objective: Our goal was to create a parsimonious combination of the Modified Somatic Perception Questionnaire (MSPQ) and the Pain Beliefs Screening Instrument (PBSI) through factorial structural analysis and to investigate the associations of the new scale (if unique) to disability, health condition, and quality of life report in patients with neck and low back pain scheduled for [spine fusion](#) surgery.

Methods: Factor analysis was used to refine all items within the two scales to four distinct factors: (1) somatic complaints of the head/neck; (2) somatic complaints of the gastrointestinal symptom; (3) pain beliefs and fear; and (4) self-perception of serious problems. Each factor was assessed for concurrent validity with other well-established tools including the Deyo comorbidity index, the Short Form (SF)-36 mental and physical component subscales, and the Oswestry and Neck Disability Indices (ODI/NDI).

Results: The PBSI was fairly to moderately correlated with assessment tools of quality of life (SF-36) and disability assessment (ODI/NDI). Some of the items in the factor 1 from the MSPQ were slightly associated with the Deyo comorbidity index but not with the ODI/NDI.

Conclusions: The items from the MSPQ failed to associate with measures of quality of life and disability and thus may provide only marginal value when assessing the multidimensional aspects associated with neck and low back pain. The PBSI has moderate correlation with disability assessments. Neither tool was found to strongly correlate with disability measures or with SF-36 scales (mental and physical component subscales). Additional tools may be needed to further

identify the dimensions associated with chronic pain patients.

Report of the 2009 World Games Injury Surveillance of Individuals Using Chiropractic

Debra Nook, DVM, MBA, Brian Nook, DC

Objective: The purpose of this study was to describe the frequency and nature of injuries treated by the International Federation of Sports Chiropractic (FICS) chiropractic health care delegation at the 2009 World Games in Kaohsiung, Taiwan.

Methods: A cross-sectional study design with descriptive statistics was used to describe the standard patient care data recorded on FICS treatment forms of individuals voluntarily using FICS chiropractors. Data included patient demographics, region of the body, type of treatment provided, and pre- and posttreatment numerical pain levels.

Results: The FICS chiropractors recorded 1,514 treatments to athletes and support personnel. There were 445 (49%) athletes and 450 (51%) nonathletes receiving care. The total number of athletes participating at the 2009 World Games was 2,906 plus 2812 support staff; thus, our utilization rates are 15.31% for athletes and 16.00% for nonathletes. Total treatments were 854 for athletes and 660 for nonathletes, including follow-up care. Treatments to 17 different body regions were recorded. The highest recorded athlete treatment region was the lumbar spine at 309 (36.18%), with thoracic spine and neck being treated 195 (22.83%) and 193 (22.60%) times, respectively. Chiropractic manipulations were administered to 583 (68.27%) of the athletes treated. Mobilizations were given to 209 (24.47%), whereas 640 (74.94%) received myotherapy and 205 (24.00%) had tape applied. Pre- and posttreatment pain scales revealed that approximately 94% of patients experienced immediate improvement.

Conclusion: These results demonstrate the findings of voluntary chiropractic care at a world-class multisport competition.

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