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Editorial Staff

A new symmetry-based scoring method for posture assessment: Evaluation of the effect of insoles with mineral derivatives

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**Background:** There is a need for a validated rapid procedure for the evaluation of posture, as defined as lateral balance/imbalance at the pelvic, shoulder and neck levels. This would enable to determine the importance of symmetry in the pathophysiology of musculoskeletal disorders, and to assess the efficacy of devices and treatments claiming to normalize or improve posture. In this study the efficacy of such devices, a set of insoles with an hypothesized proprioceptive-like action was evaluated using the described procedure.

**Objective:** To develop a new scoring system to evaluate body posture based on symmetry and to use this scoring system to investigate the efficacy of insoles containing a combination of mineral derivatives designed to balance posture through a neurophysiological effect.

**Study Design:** A crossover placebo-controlled, double-blind study and a multi-center, large scale open-label study in patients selected from chiropractic clinics.

**Methods:** The score was based on the evaluation of 4 postural parameters: pelvic and shoulder lateral balance/imbalance, static shoulder rotation and amplitude of head rotation. In the placebo-controlled study, 32 patients were tested, in a double-blind fashion, with placebo insoles or with insoles containing mineral derivatives. The same study was repeated in unblind conditions in 137 patients selected from 2 chiropractic clinics in an open-label protocol.

**Results:** A basal postural evaluation in 137 patients revealed that no patient had a perfect symmetry; that is, a perfectly or nearly perfectly balanced posture. The insoles with mineral derivatives induced a highly significant and similar improvement in the postural score in both the crossover, double-blind (32 patients, 56.7% improvement) and the open-label (137 patients, 60.7% improvement) studies ( $P < 0.001$ ).

**Conclusions:** All patients tested and selected in chiropractic clinics exhibited asymmetries and postural imbalances according to the newly developed scoring method, and this method was successful in assessing the efficacy of insoles exerting a profound and immediate postural effect through a hypothesized neurophysiological mode of action.

**Key Indexing Terms:** Posture; Proprioception; Orthotics

**Background:** Many chiropractors hypothesize that spinal manipulation affects the autonomic nervous system (ANS). However, the ANS responses to chiropractic manipulative therapy (CMT) are not well documented, and more research is needed to support this hypothesis. This study represents a step toward the development of a reliable methodology to document that CMT does affect the ANS, by exploring the use of paced breathing as a way to reduce the inherent variability in ANS measurements.

**Objective:** To examine the hypothesis that the variability of ANS measurements would be reduced if breathing was paced to a metronome at 12 breaths/min.

**Setting:** The study was performed at Parker College Research Institute. Eight normotensive subjects were recruited from the student body and staff.

**Methods:** Respiration frequency was measured through a strain gauge. A 3-lead electrocardiogram was used to register the electrical activity of the heart and arterial tonometry monitors were used to record the left and right radial artery blood pressures. Signals were recorded on an IBM compatible computer with a sampling frequency of 100 Hz. Normal breathing was used for the first 3 recordings and breathing was paced to a metronome for the final 3 recordings at 12 breaths/minute. Fourier analysis was performed on the beat-by-beat fluctuations of the ECG-determined R-R interval and systolic arterial pressure (SBP). Low frequency fluctuations (LF, 0.04 to 0.15 Hz) reflected sympathetic activity while high frequency (HF, 0.15 to 0.4 Hz) represented parasympathetic activity. Sympathovagal indices were determined from the ratio of the two bandwidths (LF/HF). The coefficient of variation (CV%) for autonomic parameters was calculated ( $[\text{average}/\text{standard deviation}] * 100\%$ ) to compare the variability when breathing normally or by a metronome. One-way analysis of variance was used to detect differences. A value of  $p < 0.05$  was considered statistically significant and all results are presented as average +/- standard deviation.

**Results:** Three male and five female normotensive subjects were studied. Metronome breathing did not produce any significant changes in blood pressure for the left and right radial arteries, heart rate and pressure pulse transmission time. Breathing to a metronome increased ECG-HF power ( $0.25 \pm 0.07$  vs.  $0.35 \pm 0.09$ ,  $p < 0.04$ ), decreased ECG-LF/HF ( $1.08 \pm 0.55$  vs.  $0.57 \pm 0.35$ ,  $p < 0.05$ ), reduced the CV% for ECG-LF ( $47.6 \pm 23.4\%$  vs.  $23.8 \pm 14.6\%$ ,  $p < 0.03$ ), ECG-HF ( $46.2 \pm 14.2\%$  vs.  $25.8 \pm 17.0\%$ ,  $p < 0.03$ ) and ECG-LF/HF ( $50.1 \pm 27.6\%$  vs.  $23.4 \pm 12.3\%$ ,  $p < 0.03$ ) compared to normal breathing. Metronome breathing increased the left and right radial artery SBP-HF fluctuations (left:  $0.11 \pm 0.05$  vs.  $0.30 \pm 0.16$ ,  $p < 0.007$ ; right:  $0.09 \pm 0.05$  vs.  $0.27 \pm 0.15$ ,  $p < 0.008$ ) and decreased the SBP-LF/HF components (left:  $3.42 \pm 2.36$  vs.  $1.14 \pm 0.88$ ,  $p > 0.03$ ; right:  $3.08 \pm 1.77$  vs.  $1.20 \pm 0.93$ ,  $p < 0.02$ ). Metronome breathing did not significantly alter the CV% for SBP-HF, SBP-LF and SBP-LF/HF.

**Conclusion:** Metronome breathing increased parasympathetic activity as evidenced by augmented HF power in the ECG and SBP data. The variability (CV%) of ECG-determined ANS measurements was significantly reduced with paced breathing at 12 breaths/minute, but no significant reductions were observed for the SBP-determined ANS measurements. These findings indicate that the ECG data is more sensitive than SBP data for future clinical trials.

**Key Indexing Terms:** Chiropractic; Autonomic Nervous System; Electrocardiogram; Arterial Tonometry; Blood Pressure.

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Mechanical force spinal manipulation increases trunk muscle strength assessed by electromyography: A comparative clinical trial.

*Tony Keller, PhD and Christopher Colloca, DC*

**Objective:** The objective of this study was to determine if mechanical force, manually-assisted (MFMA) spinal manipulative therapy (SMT) affects paraspinal muscle strength assessed using surface electromyography (sEMG).

**Design:** Prospective clinical trial comparing sEMG output in an active treatment group and two control groups.

**Setting:** Outpatient chiropractic clinic, Phoenix, AZ.

**Subjects:** Forty low back pain (LBP) subjects participated in the study. Twenty LBP patients (9 females and 11 males with a mean age of 35 years and 51 years, respectively) and 20 age-and-gende- matched sham-SMT/control LBP patients (10 females and 10 males with a mean age of 40 years and 52 years, respectively) were assessed.

**Methods:** Twenty consecutive LBP patients (SMT treatment group) performed maximum voluntary contraction (MVC) isometric trunk extensions while lying prone on a treatment table. Surface, linear-enveloped sEMG was recorded from the erector *spinae* musculature at L3 and L5 during the trunk extension procedure. Subjects were then assessed using the Activator Methods Chiropractic Technique (AMCT) protocol, during which time they were treated using MFMA SMT. The MFMA SMT treatment was followed by a dynamic stiffness and algometry assessment, after which a second or post MVC isometric trunk extension and sEMG assessment was performed. Another twenty consecutive LBP subjects were assigned to one of two control groups, a sham-SMT group, and a control group. The sham-SMT group underwent the same experimental protocol with the exception that the subjects received a sham-MFMA SMT and dynamic stiffness assessment. The control group received no SMT treatment, stiffness assessment, or algometry assessment intervention. Within group analysis of MVC sEMG output (pre-SMT vs. post-SMT sEMG output) and across group analysis of MVC sEMG output ratio (post-SMT sEMG/pre-SMT sEMG output) during MVC was performed using a paired observations t-test (POTT) and a robust analysis of variance (RANOVA), respectively.

**Main Outcome Measures:** Surface, linear-enveloped EMG recordings during isometric maximum voluntary contraction (MVC) trunk extension were used as the primary outcome measure.

**Results:** Nineteen of the 20 patients in the SMT treatment group showed a positive increase in sEMG output during MVC (range -9.7% to 66.8%) following the active MFMA SMT treatment and stiffness assessment. The SMT treatment group showed a significant (POTT,  $P < 0.001$ ) increase in erector spinae muscle sEMG output (21% increase compared to pre-SMT levels) during MVC isometric trunk extension trials. There were no significant changes in pre vs. post-SMT MVC sEMG output for the sham-SMT (5.8% increase) or control (3.9% increase) groups. Moreover, the sEMG output ratio of the SMT treatment group was significantly greater (RANOVA,  $P = 0.05$ ) than either the sham-SMT or control groups.

**Conclusions:** The results of this preliminary clinical trial demonstrated that MFMA SMT results in a significant increase in sEMG erector spinae isometric MVC muscle output. These findings indicate that altered muscle function may be a potential short-term therapeutic effect of MFMA SMT, and forms the basis for a randomized, controlled clinical trial to further investigate acute and long-term changes in low back function.

Key Indexing Terms: Biomechanics; Electromyography; Chiropractic Manipulation; Low Back Pain; Spine.

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## The role of chiropractic in primary care: Findings of four community studies

*Michele Teitelbaum, PhD*

**Objective:** To assess the receptivity of chiropractors, other health care providers, and consumers to the idea of chiropractors assuming a focal role in primary care, through qualitative studies of four medically underserved communities.

**Method:** Visits by a team of two researchers to four medically underserved communities: 1) rural towns in eastern Oregon; 2) rural towns in Iowa; 3) underserved areas of Miami, Florida; and 4) underserved areas of Chicago, Illinois. Each site visit included interviews with chiropractors, other health care providers, and managers of health facilities, as well as focus groups with consumers.

**Results:** If chiropractors were to pursue a primary care role based on an allopathic model of primary care, there would not be widespread consumer receptivity. Those consumers who are most likely to use chiropractors as primary care providers are those who prefer health care models that have a close affinity with lay conceptualizations of illness and health care.

**Conclusions:** The community studies suggested that chiropractors and consumers may prefer that chiropractors are *not* primary care providers in a conventional way, and that the allopathic community may be indifferent-to-hostile to the idea of chiropractors, and other non-MDs, as major primary care providers. Current practice models of chiropractors do not include a strong allopathic model of primary care, although they are consistent with consumer preferences and satisfying to chiropractors.

Key Indexing Terms: Chiropractic; Primary Care; Managed Care; Alternative Alternative Providers; Rural Health; Underserved Areas.

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## Resolution of suckling intolerance in a six-month old chiropractic patient

*David P. Holtrop, DC*

**Objective:** To discuss the management and resolution of suckling intolerance in a six-month-old infant.

**Clinical Features:** A six-month-old male with a 4 1/2-month history of aversion to suckling was evaluated in a chiropractic office. Static and motion palpation and observation detected an abnormal inward dishing at the occipitoparietal junction, as well as upper cervical (C1-2) asymmetry and fixation. These indicated the presence of cranial and upper cervical subluxations.

**Intervention and Outcome:** The patient was treated 5 times utilizing cranial adjusting, and 4 of those visits included atlas (C1) adjustment. The suckling intolerance resolved immediately after his first office visit and did not return.

**Conclusion:** It is possible that a relationship between mechanical abnormalities of the cervicocranial junction in the infant and suckling dysfunction may exist, and further research in

this area could be beneficial. Possible physiological etiologies of painful suckling are presented.

Key Indexing Terms: Chiropractic Manipulation; Pediatrics.

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## Conservative chiropractic care of lateral epicondylitis

*Rod L. Kaufman,DC*

**Objective:** To discuss the management of a patient suffering from lateral epicondylitis refractory to previous medical and conservative interventions.

**Clinical Features:** A 45-year-old female suffered from difficulty in supinating her left elbow due to pain from activities at work. Standard tests demonstrated and reproduced pain at the lateral epicondyle with resisted extension of the wrist and fingers.

**Intervention and Outcome:** Specific joint manipulation for relief of lateral epicondylitis was performed. Immobilization of the elbow joint after manipulation was accomplished by a sugar tong plaster splint. Follow-up joint manipulation with a progressive rehabilitation program was effective in providing relief of symptoms.

**Conclusion:** Resolution of pain and limited elbow motion was demonstrated following Mills manipulation.

Key Indexing Terms: Lateral Epicondylitis; Elbow; Chiropractic Manipulation; Orthopedic Tests.

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