

## **Correction of Atlanto-Occipital Joint Dysfunction Using the One to Zero Method Affects Cervical Proprioception: A Randomized Control Trial\*\***

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*Objectives:* Vertebral column dysfunction induces maladaptive plasticity, impacting head and neck proprioception. The One-To-Zero (OTZ) Treatment method aims to correct an articular dysfunction between the occipito-atlantal joint (C0 – C1), where proprioceptors are densely located. This method could improve proprioceptive awareness of the head and neck. *Methods:* 63 participants ( $41.8 \pm 14.0$  years of age) with an articular dysfunction of the C0-C1 joint were randomly allocated to a control ( $n = 31$ ) or treatment ( $n = 32$ ) group. Neck ranges of motion, cervical joint position sense (head to neutral (HtoN) and head to target (HtoT)) were measured using a cervical range of motion (CROM) device at baseline and following treatment or 2-week control period. HtoN: participants replicated their self-selected neutral following active maximum head rotation. HtoT: in random order participants replicated both 50% or 65% of their maximum neck rotation with eyes closed. Three trials per side were performed for all proprioceptive measures. Absolute, constant, and variable error of the average angle was calculated, and all measures were compared using a 2x2 repeated measures ANOVA with pre-planned contrast to baseline. *Results:* Time by group interaction: Neck ROM – Improvements in extension ( $p < 0.001$ ), lateral flexion ( $p < 0.001$ ) and rotation ( $p = 0.001$ ). HtoN – Improvements in: absolute error ( $p < 0.05$ ). HtoT (50%) – absolute ( $p = 0.001$ ) and variable error ( $p < 0.001$ ). *Conclusion:* The OTZ method improves neck range of motion, and proprioceptive awareness of the head and neck in those with an articular dysfunction of the C0-C1 joint complex.

\*\*Note: This is a conference presentation abstract and not a fully published work.

## **The Effect of the One to Zero (OTZ) Method on Motor Control of the Neck and Limbs: A Randomized Control Trial\*\***

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*Objective:* Motor control of the neck and the limbs are impacted by spinal pain, and appears to improve when an articular dysfunction at the occipito-atlantal (C0-C1) joint is addressed via the One-to-Zero (OTZ) method, likely by restoring correct afferent input and motor output. This randomized control trial sought to determine whether the OTZ method is effective in improving neck and limb motor control, compared to no treatment. *Methods:* 72 participants with an articular dysfunction of the C0-C1 joint were randomized into a control ( $n = 36$ ) or treatment ( $n = 36$ ) group. Shoulder ROM, peak force and root mean square during resisted scapular elevation (upper trapezius) and resisted neck flexion (SCM), peak force output of the upper arm (hand grip) and quadriceps were measured at baseline, and following treatment or 2-week control period. Two trials were averaged for each measure except for shoulder ROM. Neuromuscular efficiency (NME) was calculated for the upper trapezius and SCM. Outliers were removed before running ANOVAs with pre-planned contrast to baseline. *Results:* Time by group interaction: Shoulder ROM – abduction ( $p < 0.001$ ), flexion ( $p < 0.05$ ) and extension ( $p < 0.01$ ); Force – Upper Trapezius ( $p < 0.05$ ), and SCM ( $p < 0.05$ ). Time by side by group interaction: Upper Trapezius NME ( $p < 0.05$ ) and quadriceps strength ( $p < 0.05$ ). *Conclusion:* The OTZ method improves neuromuscular function of the upper trapezius, gross motor function of the SCM and quadriceps, and mobility of the shoulder in those with an articular dysfunction of the C0-C1 joint complex.

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