**Effect of a Period of Cervical Flexion on Upper Extremity Muscle Strength**

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As daily technology use increases, there is an increase in periodical cervical flexion, which can cause a strain on the neck and muscles of the upper extremity. It has been studied that on average people regularly experience cervical flexion of 45 degrees during handheld technology use.

**PURPOSE:** Examine the effect that 30 minutes of cervical flexion has on upper extremity muscle strength, specifically the biceps brachii, triceps brachii, and middle deltoid.

**METHODS:** Twenty-four participants (12 male, 12 female) (n=24; height= 173.1±9.3 cm; weight=73.3±22.58 kg) were measured before and after 30 minutes of degree of cervical flexion in a seated position using a MicroFET2 Hand Held Digital Muscle Tester to isometrically test each muscle. Paired Samples T-test was used to determine overall strength changes and percent strength decreases.

**RESULTS:** Significant changes in muscle strength were evident in the left biceps brachii (254.1±101.5 vs 239.87±103 N, p<0.05), right biceps brachii (270.67±96.23 vs 254.5±102 N, p<0.05), left middle deltoid (140.82±54.27 vs 125.42±51.27 N, p<0.05), and right middle deltoid (129.2461 vs 122.89±49.76 N, p<0.05). No significant strength changes were measured in either triceps muscle. Minimal changes were seen across contralateral arm muscles and across genders. When comparing dominant to non-dominant arms, significant changes in percent strength change were found in the dominant biceps brachii (272.8±100.77 vs 269.15±109 N, p<0.05), non dominant bicep brachii (251.94±96.59 vs 235.23±95.74 N, p<0.05), dominant triceps brachii (151.6±54.59 vs 141.3±51.32 N, p<0.05), dominant middle deltoid (132.6±47.92 vs 125±49.13 N, p<0.05), and non dominant middle deltoid (137.4±53.21 vs 124.27±51.92 N, p<0.05).

**CONCLUSION:** A normal daily degree of cervical flexion will decrease some upper extremity strength over the course of 30 minutes.

**Effects Of An Exercise And Kinesiotape Intervention On Forward Head/Rounded Shoulder And Scapular Dyskinesis**

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Improper posture including forward head, rounded shoulder and scapular dyskinesis have been linked to neck and shoulder pain. Treatment for forward head posture (FHP), rounded shoulder posture (RSP), and scapular dyskinesis has consisted of an exercise protocol. Kinesio tape (KT) has recently emerged as a treatment method but there is a lack of research on the effectiveness, or whether exercise or KT is better than the other.

**PURPOSE:** To compare a KT intervention to a strengthening and stretching program for correction of FHP, RSP, and scapular dyskinesis in a healthy, non-athletic, college age population.

**METHODS:** Twenty healthy college-aged subjects with forward head, rounded shoulder posture and scapular dyskinesis completed the study. There were 10 subjects (7 females, 3 males, 20.30±.82 yr, ht=171.07±11.82 cm, wt=79.47±13.79 kg) in the exercise group and 10 subjects (7 females, 3 males, 20.40±1.43 yr, ht=166.61±11.99 cm, wt=69.40±11.48 kg) in the KT group. Subjects were randomized into two intervention groups undergoing a four-week program. One group participated in a strengthening and stretching exercise protocol (EG) based on the current literature, while the other group had KT applied to the upper back and shoulders for a duration of five days with two days of no tape in a seven-day period. Pre-and post-test measurements included the craniovertebral angle (CVA) in degrees, forward shoulder angle (FSA) in degrees, and scapular dyskinesis as assessed using scapular dyskinesis scoring (0-3, maximum combined score = 8) for each scapula.

**RESULTS:** There was a significant time main effect for the scapular dyskinesis score (SDS) as both groups improved pre-to-post intervention (F=12.55, P<.01; EG=128.1±14 vs 5.3±9.49, KT=140.4±59.4±9±1.01). Time effect sizes were small to moderate for CVA (EG=13 to EG=53, RSA (EG=15 to KT= -46) and SDS (EG=44 to KT=50) in both groups. Group effect sizes were small for CVA (0.24), RSA (0.25) and SDS (0.36). Minimal-detectable-change-scores were achieved for the CVA (EG=3.90, KT=80) and SDS (EG=50, KT=80) for both groups, indicating clinical improvement. No other results were significant. **CONCLUSIONS:** Both groups improved pre-to-post intervention for the three measurements, even though only SDS was significant. Thus, either treatment could be used.

**Stimulation Techniques used to Assess Corticospinal Excitability Alters an Attentional Focus Maximal Voluntary Contraction of the Elbow Flexors.**

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**PURPOSE:** To investigate the role of attentional focus on force output by assessing 1) force output during maximal voluntary elbow flexion contractions, 2) corticospinal excitability and 3) motor unit activation patterns.

**METHODS:** 7 resistance-trained males completed two experimental sessions. Each session consisted of 12 maximum voluntary contractions (MVC) with 180s rest of recovery between MVC. Participants were given counter-balanced external and internal attentional focus conditions prior to each MVC to direct attention. Force output and electromyography (EMG) of the biceps brachii, triceps brachii, and brachioradialis were recorded for both sessions. Transcranial magnetic stimulation, transmastoid electrical stimulation, and brachial plexus electrical stimulation were used to produce motor evoked potentials (MEPs), cervicomedullary motor evoked potentials (CMEPs) and maximal M-waves (Mmax) in the biceps brachii during each MVC in one of the two sessions. All MEPs and CMEPs were normalized to Mmax.

**RESULTS:** Forces produced during the stimulation session were not significantly different between external and internal focus conditions (p = 0.20). However, forces produced during the non-stimulation session were 19.9% higher with an external cue compared to internal cues (p = 0.05). As well, forces produced with external cues were 13.2% greater during the non-stimulation session compared to the stimulation session. (p<0.05). EMG activity was not found to be significantly different between attention focus cues (p>0.1).

**CONCLUSIONS:** The usage of stimulation techniques likely distracted participants from the attentional focus cues provided during the stimulation session. Therefore, we were unable to successfully assess changes in corticospinal excitability between focus conditions. However, we were still able to show that external cues direct greater force production of the elbow flexors compared to internal cues.