EFFECT OF PLYOMETRIC NECK MUSCLE TRAINING ON HEAD-NECK SEGMENT KINEMATICS AND DYNAMIC STABILIZATION DURING SOCCER HEADING – A PILOT STUDY


**Context:** Brain injury is directly related to head acceleration experienced during head impact. Neck muscle strengthening has been purported to reduce head acceleration. Isometric and isotonic neck muscle training have elicited strength gains, yet no protocol has educated head kinematic changes during a functional task. **Objective:** This study investigated the effect of plyometric neck muscle training on head-neck kinematics.

**Design:** A pre-test, post-test control group design. **Setting:** University weight room and research laboratory. **Participants:** Twenty (experimental group N = 13, age = 18.9 ± 0.64 yrs, height = 166 ± 5.6 cm, body mass 62.7 ± 4.4 kg, head mass = 5.1 ± 0.35; Control group N = 7, age = 19.5 ± 0.54 yrs, height = 165 ± 8.2 cm, body mass 64.8 ± 5.5 kg, head mass = 5.3 ± 0.46 kg) division I female soccer players. **Intervention:** The experimental group performed an 8-week training program using resistive tubing during their off-season training. The training consisted of three sets of ten repetitions (1 rep/sec), and tubing resistance was increased every two weeks. The control group performed no neck exercises. **Measurements:** Head-neck anthropometrics and isometric strength were assessed pre and post training. Neck muscle preparatory and reactive activity (i.e., left and right SCM and Trapezius) and resultant head acceleration were measured pre and post training during 4 soccer headers. **Results:** There was a significant effect for time when assessing isometric strength for flexion, F(1,19) = 5.7, p = .027, left rotation, F(1,19) = 14.6, p = .001, and right rotation, F(1,19) = 10.7, p = .004. Subjects exhibited 21, 32, and 29% greater flexor, left and right rotator strength, respectively, during the post-test versus the pre-test. No other significant differences existed. **Conclusion:** This pilot study is the first to assess the effect of plyometric neck muscle exercise on head-neck stability during a functional task. Although neck muscle strength gains were elicited, muscle activation strategies and head acceleration were not altered significantly in our sample. There was a trend, F(1,19) = 1.7, p = .210, power = .234, toward a significant group by time interaction for head acceleration. The experimental group head acceleration was reduced 4% relative to a slight increase in the control group over time. Future research should assess neck muscle training effects in a larger sample of soccer players (at greater training intensities), other athletes, and physically active non-athletes. **Key words:** Neck muscle training, head acceleration.