

MULTIFIDI ACTIVATION USING VOLITIONAL PREEMPTIVE ABDOMINAL CONTRACTION DURING DIFFERENT ISOMETRIC BARBELL DEADLIFTS. McCormick J, Lotrich K, Mott N, Price T, Sitton B, McIntosh M. Hardin-Simmons University Department of Physical Therapy, Abilene, TX.

PURPOSE: The purpose of this study was to investigate the relationship between volitional preemptive abdominal contraction (VPAC) and non-volitional preemptive contraction on lumbar multifidus muscle (LMM) activation while performing a maximal isometric traditional barbell deadlift versus trap bar deadlift. **SUBJECTS:** Men and women, age 18-30, who were capable of performing a maximal isometric deadlift (both traditional and trap bar) as well as voluntarily contracting abdominal muscles were invited to participate in the study. **METHODS:** Thirty-one subjects were included in the study. One subject was excluded after testing due to equipment error leaving thirty subjects for statistical analysis. Subjects read and signed a consent form that explained the purpose of the study. Researchers recorded height, weight, blood pressure, and heart rate prior to any lifting. Subjects performed a dynamic warm-up routine including 10-yard walking quad stretch, 10-yard walking single leg toe touch, 10-yard walking piriformis stretch, 10-yard Frankenstein walk, 10-yard inch worm, 10-yard front lunge, 10-yard reverse lunge, 10-yard side lunge (alt each step), 10-yard walking calf stretch, and 10-yard jog. Baseline measurements of cross-sectional area (CSA) of the right LMM were taken at L4 on each subject in a relaxed prone position using diagnostic ultrasound. Position of the ultrasound head was marked in the relaxed prone position. Testing included four isometric lifts: traditional deadlift without VPAC, traditional deadlift with VPAC, trap bar deadlift without VPAC, and trap bar deadlift with VPAC. Each lift was followed by a rest period of two minutes. The subjects were given lifting instructions prior to performing the lifts. The lifting procedure consisted of a three second countdown followed by a five second maximal isometric lift. During each 5 second lift, the LMM CSA was measured at L4 using diagnostic ultrasound. A 2-way repeated measures ANOVA was used to assess CSA of the LMM during different lifts. **RESULTS:** The mean age of the subjects was 23 (± 1.45) years. Statistical significance (95% CI) was found when comparing maximal isometric deadlifts. Significant values were defined as the mean change of the LMM CSA from baseline (relaxed prone) to the testing positions of the maximal isometric deadlifts. VPAC (5.11 ± 0.61 cm) resulted in greater CSA than non-VPAC (4.88 ± 0.59 cm) regardless of deadlift type ($p=0.000$). **CONCLUSIONS:** Although no significant differences were seen between deadlift type, the maximal isometric deadlifts with VPAC produced greater LMM CSA than without VPAC. **CLINICAL RELEVANCE:** Since LMM CSA has been correlated with increased stabilization of the lumbar spine, physical therapists should recommend using VPAC in weightlifting programs. LMM CSA has been correlated with increased stabilization of the lumbar spine. Utilization of VPAC may be important in the reduction of mechanical stress on the lumbar spine, especially in individuals with prior history of low back pain.