

## DIFFERENCES IN THE BIOMECHANICAL RESPONSE BETWEEN HEALTHY AND LOW BACK PAIN PATIENTS FROM A ISOMETRIC EXTENSION TEST

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**Purpose:** To compare, in healthy subjects and low back pain patients, the erector spinal muscle response in a maximum isometric contraction intensities using simultaneously electromyography and ultrasonography.

**Participants:** 59 subjects: 33 Healthy persons (45% ♀). 26 LBP patients (39% ♀) with a mean age of 30.39 ( $\pm 7.785$ ).

**Methods:** Cross sectional study. Participants, following a maximal strength test as measured by a load cell, perform an isometric contraction of maximum strength. From sitting, each subject develops a maximum isometric lumbar extension, locked at 45 degrees from vertical. The hip and this of the subject were attached by a strap. After preliminary training, each subject performed three repetitions of described gesture resting for a minute and a half between each attempt. Records were taken throughout the maximum contraction, EMG signal and a ultrasonography image, for each ES (right and left). Measured torque, inclination angle, thickness and electromyography activation (MVC).

**Analysis:** We performed a descriptive analysis of both groups and subsequently made T-Student test for independent data in each of the variables measured.

**Results:** Mean values for groups of healthy subjects and low back pain patients were, respectively: Torque: 61.652 ( $\pm 20.137$ ); 70.298 ( $\pm 25.053$ ). Right Angle: 6.48 ( $\pm 2.181$ ); 7.15 ( $\pm 2.53$ ). Left Angle: 5.36 ( $\pm 2.26$ ); 6.38 ( $\pm 1.86$ ). Right Thickness: 0.031 ( $\pm 0.005$ ); 0.033 ( $\pm 0.008$ ). Left Thickness: 0.032 ( $\pm 0.006$ ); 0.034 ( $\pm 0.006$ ). Right MVC: 558.64 ( $\pm 211.029$ ); 576.15 ( $\pm 267.69$ ). Left MVC: 589.21 ( $\pm 257.739$ ); 671.15 ( $\pm 370.722$ ). No significant differences were found in any variable when comparing the results between healthy subjects and low back pain patients. Torque:  $-8.65$  ( $\pm 9.02$ ) ( $p = 0.347$ ). Angle: Right:  $-0.659$  ( $\pm 0.613$ ) ( $p = 0.280$ ); Left:  $-1.021$  ( $\pm 0.549$ ) ( $p = 0.068$ ). Thick-ness: Right: 0.00 ( $\pm 0.00$ ) ( $p = 0.259$ ); Left: 0.00 ( $\pm 0.00$ ) ( $p = 0.069$ ). MVC: Right:  $-17.52$  ( $\pm 62.29$ ) ( $p = 0.780$ ). Left:  $-81.84$  ( $\pm 81.91$ ) ( $p = 0.321$ ).

**Conclusions:** Knowing how the erector spinal muscle behaves in a isometric back extension test, noting that biomechanically there are not significant differences in the responses with respect to a healthy subject, physical therapists could perform planning treatment which is the biopsychosocial model supported by the biomechanical model.