

# EXPERIMENTALLY INDUCED PAIN ALTERS THE EMG ACTIVITY OF THE LUMBAR MULTIFIDUS DURING FUNCTIONAL TASKS

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## **Purpose**

To determine whether experimentally induced low back pain impacts the magnitude of activation of the lumbar multifidus during weight shifting and upper extremity lifting tasks.

## **Relevance**

Dysfunction of the lumbar multifidus muscle in patients with low back pain has been reported and a variety of therapeutic interventions have been proposed. It is known that pain alters motor control. Induced, as well as clinical low back pain, have been shown to decrease the magnitude and delay activation in deep stabilizing muscles such as the transverse abdominis. Less is known about the pain-related changes in the lumbar multifidus. A better understanding of how pain affects the lumbar multifidus during functional tasks may help guide intervention for multifidus dysfunction which is commonly encountered clinically.

## **Methods**

A convenience sample of 23 healthy adults was enrolled in this study. Intramuscular EMG activity of the lumbar multifidus at the L4 level was measured during 2 tasks, dominant side shoulder flexion/extension and staggered-stance weight shifting. Data were collected at baseline, after pain was induced with hypertonic saline, and after the pain had subsided.

## **Analysis**

The data were expressed as a percent of maximum voluntary isometric contraction. Comparisons of within-subjects effects were performed with the use of a two-way repeated-measures ANOVA. The least significant difference (LSD) method was used for post hoc testing. A p-value of less than 0.05 was considered to indicate statistical significance.

## **Results**

17 subjects were included in the final analysis. A significantly higher magnitude of activity was found in the induced-pain condition as compared to the baseline condition for the shoulder extension phase of the upper extremity task. During weight shifting, significantly lower values in both the induced-pain and the recovery conditions were measured.

## **Conclusion**

Across trials and subjects the EMG amplitudes were increased during the extension phase of the upper extremity task and decreased during the weight shifting task. This would suggest that the lumbar multifidus does not respond to induced pain in the same manner during these functionally oriented tasks.

## **Implications:**

These findings support the adaptive pain model as described by Lund et al. which predicted that muscle activation will respond differently in the presence of pain.

Additionally, these findings may support the need for individually designed interventions for those with low back pain based on whether a high or low threshold strategy is present.

## **Keywords:**

low back pain, motor control, pain adaptive model