

## Abstract

This thesis evaluates the possibility of using objective measurements to assess the postural function of abdominal muscles. The theoretical part provides an overview of findings regarding postural function of the abdominal muscles and the context for their co-activation using intra-abdominal pressure. The results are summarized in the form of research studies relating postural function and low back pain (LBP). The overview of the methods used to measure intra-abdominal pressure and the abdominal muscle activity is the main focus. In this section, we present a new methodology for measuring the activity of the abdominal muscles by using pressure sensors attached to the abdominal wall in the areas of the groin and the lumbar triangle.

**Methodology:** In the experimental part, we tested 35 healthy subjects (average age 21.26t, SD  $\pm$  1,62) in 3 posturally different seated scenarios: 1. resting breathing, 2. with added external load (the subjects held a dumbbell 20% of their body weight) and 3. with maximum voluntary increase in intra-abdominal pressure (the diaphragm test).

**Results:** An independent samples t-test indicated that the pressure created by the abdominal wall for both sensors in situation resting breathing increases in situation external load (HA1: upper sensor  $p=0.0079$ , lower sensor  $p=0.0009$ ). We have also shown that the pressure created by the abdominal wall for both sensors in situation resting breathing increases in situation diaphragm test (HA2: upper sensor  $p=<0.0001$ ; lower sensor  $p=0,0009$ ). Furthermore, there was a significantly greater increase in abdominal muscle activity during the diaphragm test (scenario #3) compared to the external load scenario (H3: upper sensor  $p=0.0167$ ; lower sensor  $p=0.0196$ ). There was no statistically significant difference in abdominal pressure changes between sensors in the scenario with added external load (scenario #2) and also in the diaphragm test scenario (H4: added external load  $p=0.9094$ ; diaphragm test  $p=0.6677$ ).

**Conclusion:** During this study, a new methodical procedure was presented to objectively measure the level of activation of the abdominal wall by using sensors to measure intra-abdominal pressure in three different postural scenarios. A new method of measurement using the unique sensors presented in this thesis could help to propose new standards of abdominal wall activation for a healthy population. In future, this method may be used during standard examination to provide objective measurements to evaluate the effect of therapy. It can also

serve as therapeutic biofeedback for clients with back pain and other functional pathologies of the locomotor system.