

Abstract

This thesis is focusing on objectifying the postural function of diaphragm with a biofeedback sensor in patients with low back pain (LBP). The theoretical part provides an overview of known facts about the postural function of the abdominal muscles and diaphragm and the connection between their activation and the change in intra-abdominal pressure and the origin of LBP. The thesis gives specifics of LBP, its etiology and possible methods of classification of non-specific LBP, as well as the methods of evaluating subjective disability. Other methods of objectifying postural functions other than the one used in this thesis are mentioned briefly.

Methodology: In the experimental part, we used a capacitive force sensor to test 31 patients with non-specific chronic LBP (aver. age 25.25, SD \pm 4.66, aver. height 176.77 cm, SD \pm 9.97, aver. weight 77.93 kg, SD \pm 18.40) in 3 posturally different seated scenarios - resting breathing, with added external load when the subjects held a dumbbell of 20 % of their body weight) and with maximum voluntary increase in intra-abdominal pressure (the diaphragm test). The sensor position was on lumbar triangle and in the groin area. Oswestry Questionnaire v2.1a was used to evaluate subjective disability.

Results: An independent t-test analysis shows increase in the pressure created by the abdominal muscles in both the situations with external load (HA1: upper sensor $p = 0.0012$, lower sensor $p = 0.00018$) and during diaphragm test (HA2: upper sensor $p = 7.86 \text{ E-}06$, lower sensor $p = 1.89\text{E-}08$). Comparing diaphragm test situation to external load situation showed increase of muscle activity only on the lower sensor (H3: upper sensor $p = 0,5307$, lower sensor $p = 0,0316$). The difference in abdominal pressure changes between the upper and lower sensor in each situation was significant only in external load situation (H4: EL $p = 0,0273$, DT $p = 0,1619$). Using Pearson correlation coefficient didn't show a dependence of activation of the muscles of the abdominal wall on ODI in either situations (H5: upper sensor $r=0.191409$, lower sensor $r=0.162829$; H6: upper sensor $r=0.136502$, lower sensor $r=0.301563$).

Conclusion: This thesis was investigating the possibility of using a new method of objective measurement of activation of abdominal wall and through it indirectly also of intra-abdominal pressure and diaphragm activation in people with LBP. The results show significant increase in the activity of abdominal wall muscles in posturally demanding situations in people with LBP. The used method could in the future serve as standard

examination, biofeedback therapy and an objective measuring of the effect of therapy in people with LBP and other torso pathologies.