Abstract

Introduction: The aim of this work was to determine the difference in abdominal wall expansion and thus indirectly the amount of intra-abdominal pressure in various postural positions, first without any correction, then after verbal and manual instruction according to Dynamic Neuromuscular Stabilization (DNS) principles. The amount of activation of abdominal wall muscles in various postural positions helps determine the positions in which optimal postural stabilization is best activated. These positions may be suitable for postural therapy and training. The theoretical part introduces optimal trunk stabilization according to developmental kinesiology principles and DNS concept. Then, the relationship between the intra-abdominal pressure and postural activity of abdominal muscles is introduced as well as the most common methods of objectification.

Participants and Methods: 30 healthy subjects (15 women and 15 men) aged 20 to 25 years (mean age 22.73 years, SD 1.88) were tested using the Ohm Belt device. This device uses pressure sensors that are attached to the abdominal wall in the area above the groin and in the trigonum lumbale and thus allows non-invasive monitoring of abdominal wall expansion and indirect measurement of the intra-abdominal pressure. The subjects were tested in five postural positions based on developmental kinesiology (sitting, 3 months supine position, squat, bear and hang position). First, spontaneous activity was measured, then the subjects were verbally and manually instructed to optimally stabilize the trunk as defined by DNS principles and measured again.

Results: Abdominal wall activity increased significantly after manual instruction according to DNS principles compared to spontaneous activation. Both sensors recorded significant increases ($p < 0.005$; Cohen's $d = -1.13$ to -2.06) in all observed postural situations. The increase in activity occurred simultaneously on both sensors, there was not significant difference in pressure increase between the sensors. The greatest activation on both sensors occurred in the bear position. Significant increases in activity were identified for both sensors in three months and in the bear position compared to spontaneous activation in sitting ($p < .001$). There were no statistically significant differences (for both sensors) between women and men in any position.

Conclusion: The amount of abdominal wall activation in all postural developmental positions significantly increases after verbal and manual instructions according to DNS. The greatest abdominal wall activation was achieved in the bear position.

Keywords

Core stabilization, intra-abdominal pressure, abdominal muscles, force sensor, Dynamic Neuromuscular Stabilization (DNS)