Effects of External Core Support on Dynamic Stability and Core Proprioception

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Introduction: Core stability and proprioception are influenced by the interdependence of the hip, pelvis and lumbar spine and the vital role of the hip abductor musculature in affecting this region. The objective of this study was to assess the effects of a novel core support garment on core proprioception and dynamic stability. **Methods:** Fourteen healthy participants (9 male, 5 female) performed a dynamic landing task and a core proprioception unstable sitting task while wearing form-fitting, athletic shorts with built in core support (CS) and without support (WOS). Participants performed single leg landings onto a force platform and kinematics and kinetics of the lumbar spine, pelvis, hip, knee and ankle segments were calculated using OpenSim. The frontal plane moment arm of the ground reaction force was calculated throughout the landing task at the ankle, knee and hip. For the core proprioception task, participants sat on an unstable surface for three trials with the eyes open, and with the eyes closed and under two levels of task difficulty: a sphere diameter of 39 cm and 44 cm. Core proprioception performance was represented by the average velocity of the 3D marker path length within the first 5 seconds of the unstable sitting task. **Results:** The peak hip abductor moment was reduced on average by 6.3% when landing with CS (WOS: -123.4 ± 35.8 Nm vs. CS: -115.0 ± 25.4 Nm; p=.041;). The moment arm at peak GRF reduced with core support by an average of 0.9 cm at the knee joint (CS: -1.22±1.16 vs. WOS: -2.27±1.68 cm; p=0.001) and 1.9 cm at the hip joint (CS: -4.71±1.64 vs. WOS: -6.79±1.53 cm; p<0.001). The average velocity of 3D path length significantly increased with increasing task difficulty for each unstable sitting condition (p<0.001). However, the increase when visual input was removed was 19.1% smaller with the addition of core support (p=0.04). **Conclusion:** Core support designed to enhance the function of the gluteus medius produced an immediate motor adaptation resulting in significant improvements in dynamic stability and core proprioception. Continued used of supportive technology that takes advantage of the interdependence of the lumbo-pelvic region and the role of the hip abductors can lead to improved clinical outcomes and decreases in injury rates during highly dynamic tasks.