Cortical activity, kinematics and trunk muscles activity response to pelvis movements during unstable sitting

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ABSTRACT

BACKGROUND: Balance control is a leading component of human motor activities and its impairment is associated with an increased risk of falling, lower back pain due to impaired motor control mechanism. A prolonged sitting position at the workplace is one of the risk factors of reduced postural control and lower back pain.

OBJECTIVE: To evaluate theta and alpha waves cortical activity, trunk muscles activity and kinematics in static sitting, dynamic sitting on different platforms: simple wobble board (WB) and wobble board on bearing surface (WBB).

METHODS: The kinematics of body segments, electromyography of five trunk muscles, electroencephalography of 32 scalp electrodes were measured during balance tasks in sitting position for 17 subjects with a continuous seated position at the workplace.

RESULTS: Cortical power on WBB1 increase in fronto-central (p < 0.05) region while on WBB2 increase in centro-parietal region (p < 0.05). WBB2 increase more muscles compared with WB2. The amplitude of movement of ASIS, Th10 can be seen lower on WB compared with WBB (p < 0.05).

CONCLUSIONS: Literature is limited when comparing physiological and biomechanical parameters in a dynamic sitting. The main aspect is to show WBB which can increase personalized sitting and improve trunk motor control during hours of prolonged sitting.

KEYWORDS: electromyography, electroencephalography, occupational sitting, trunk control, wobble board.