



Spine

Supplemental PowerPoint Slides

DYNAMIC STABILITY OF THE TRUNK DURING UNSTABLE SITTING IN PEOPLE WITH LOW BACK PAIN

M Freddolini, S Strike and RYW Lee
University of Roehampton, London, UK



Spine

Key Points

- Low back pain (LBP) subjects show decreased spine mobility but increased hip motions during unstable sitting.
- The kinematic response of the trunk is similar to an under-damped second order mechanical system.
- The kinematic strategies are effective as their ability to regain dynamic stability is not compromised.



Spine

ABSTRACT

Study Design: Cross-sectional study.

Objective: To evaluate the dynamic stability and kinematics of the trunk during unstable sitting, and to determine the differences in these biomechanical parameters between healthy participants and participants with low back pain (LBP).

Summary of Background Data: Patients with LBP exhibited alterations in trunk kinematics while performing different dynamic tasks and in static posture as a result of pain. It is not clear if changing in trunk motion may reduce postural control and the ability to perform a balancing task.



Spine

Methods: Twenty-three participants with LBP and 31 healthy participants were requested to sit on a custom-made swinging chair and to regain the balance after tilting the chair backward for 10° and 20° . Lumbar spine, pelvis, and chair motions were recorded using FASTRAK sensors. The thoracolumbar curvature of all participants was also evaluated in the standing position. The angular displacement of the chair was fitted in an equation describing the underdamped second-order response to a step input.



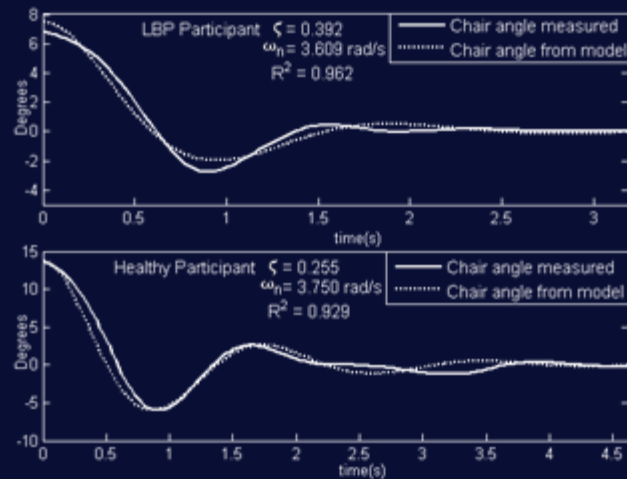
Spine

Results: Kinematic analysis showed that the hip range of motion increased whereas spine range of motion angle decreased in participants with LBP for both tilt angles ($P < 0.05$). There were no significant differences between the 2 subject groups in the time required to regain balance, and the natural frequency and damping ratio of the kinematic equation. Lumbar lordosis significantly decreased in LBP group.

Spine

Kinematic responses of healthy and low back pain participants

Kinematic responses of healthy and low back pain participants





Spine

Conclusion: Participants with LBP showed trunk postural and movement adaptations that seems to be compensatory strategies to decrease the risk of further injuries and aggravation of the symptoms, but their ability to regain the balance was not affected by LBP.

Recommendation: Clinicians should encourage patients with LBP to remain active while they are experiencing pain.

SwingChair

Autonomic Orthotic Seating

SwingChair.com