EFFECT OF THE LUMBAR BELT ON TRUNK MOBILITY: A COMPARATIVE CLINICAL STUDY

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Introduction

Low back pain (LBP) is a highly prevalent health problem worldwide, with higher economic and social costs. Evidence suggests that lumbar belts may be beneficial in the treatment of LBP, as they reduce pain levels, limit extreme movements and significantly improve functional status and posture [1]. However, very few studies have reported on the biomechanical effects of wearing a lumbar belt during trunk movements.
In a clinical study, we aim to investigate several subjective and objective criteria in order to evaluate and understand the mechanisms of the benefit provided by the lumbar belt during different movements.
The effect of the lumbar belt on the spinal mobility using the fingertip to floor distance (FTF) and sternum to wall distance tests was assessed as a primary outcome. Secondary outcomes include kinematics of the spinal segments using a developed IMU-based system [2], and pressure applied by the belt on the trunk using piezoresistive sensors. Measurements will also include a numerical scale (NS) to assess pain levels, Oswestry Disability Index (ODI) to measure functional abilities related to LBP.
In this work, we present the first findings of this ongoing study, allowing us to draw some conclusion, especially about the mobility of the trunk.

Methods

A cohort of 16 LBP subjects and 16 matched controls were recruited for the study.
All measurements were performed during various movements such as anterior and posterior flexion, left and right lateral flexion, and the sit-to-stand movement. For assessing mobility, angular kinematics were measured with and without the belt, by means of 2-IMU sensors located at the L1, and L5 vertebrae. Outcome measures include lumbar lordosis, thoracic kyphosis, pelvic tilt and range of motion (ROM) of the lumbar and thoracic spine.
Clinical tests of spinal mobility using the FTF test in forward flexion, the FTF test in lateral flexion and the sternum to wall test in extension were also assessed.
Data were statistically analyzed using the Wilcoxon signed rank test to quantify the effect of wearing the belt on each variable.

Results

First findings were obtained for the lumbar spine kinematics using two sensors IMU located at L1 and L5 of 10 subjects (figure 1) and for spinal mobility tests in 5 subject (figure 2).

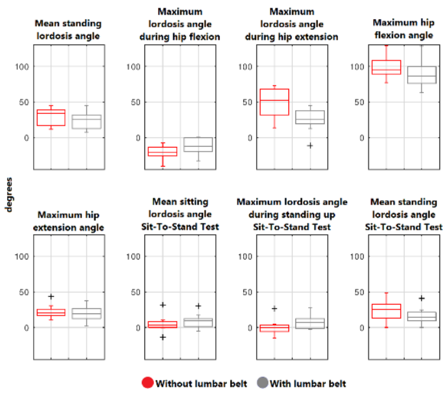

Table 1: Kinematics results of the lumbar spine

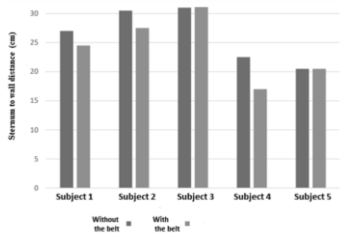

Table 2: Results of sternum to wall distance test during extension in 5 subjects.

Discussion

Obtained statistical results revealed a positive impact of wearing a lumbar belt on the majority of variables, with the exception of the maximum extension angle. By including all subjects and conducting all experiments, further insights into the clinical and biomechanical effects of lumbar belts during movements can be obtained.

References

1. Calmels et al, Spine, Spine. 3: 215–220, 2009.
2. Molimard, J. et al., arXiv preprint arXiv : 2104.03565 2021.