

The Effects of a Temporal Warning Signal on the Biomechanical Preparations for Sudden Loading

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Summary: An experiment was performed to evaluate the biomechanical preparations exhibited in anticipation of sudden loading. Four experienced subjects received sudden loads at 1 min intervals. An analogue display was used to convey the time remaining in the 1 min intervals. The dependent measures included the electromyographic (EMG) data obtained from eight trunk muscles and the changes in body posture. These data were compared with data from a baseline session in which no timing display was available. In both sessions, when loads were anticipated the back muscles were tensed. However, with the timing display available there was an alteration in the preparatory co-contraction of the trunk muscles. The change in co-contraction was primarily due to the increased torque generated by the erector spinae (ES) as opposed to a decrease in the torque generated by the anterior muscles. This indicated that there was less stiffening of the torso during preparation when temporal information was available. During the sudden loading three of the four subjects reduced the peak compressive forces on the spine predicted via an EMG driven model while maintaining consistent levels of trunk stability.

Key Words: Sudden loading—Preparation—Low back disorders—Perturbation—Electromyography—EMG—Ergonomics.

J. Electromyogr. Kinesiol., Vol. 5, 45–56, March