

Effect of Lifting Belts on Trunk Muscle Activation during a Suddenly Applied Load

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The National Institute for Occupational Safety and Health suggests there is insufficient biomechanical or epidemiological evidence to recommend the use of back belts in industry. From a biomechanical perspective, previous work suggests that lifting belts stiffen the torso, particularly in the frontal and transverse planes. To determine whether lifting belts stiffen the torso and alter the trunk muscle response during a sudden loading event, we tested the hypotheses that (a) lifting belts alter peak muscle activity recorded with electromyography (EMG) during sudden loading and (b) lifting belts have a larger impact on trunk muscle response when sudden loads are applied asymmetric to the torso's midsagittal plane. A sudden load was delivered to 10 men and 10 women without history of low back disorder via a cable attached to a thoracic harness; motion was restricted to the lumbar spine. Results indicate that gender was not a significant factor in this study. The lifting belt reduced the peak normalized EMG of the erector spinae muscles on average by 3% during asymmetric loading, though peak normalized EMG was increased by 2% during symmetric loading. Lifting belts have been shown to slightly reduce peak erector spinae activity during asymmetric sudden loading events in a constrained paradigm; however, the effects of lifting belts are too small to provide effective protection of workers. Actual or potential applications include the assessment of lifting belts as protective devices in workers based on the effects of lifting belts on the trunk muscle activity.

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