

EFFECT OF WEARING WORK BOOTS ON LUMBAR SPINE FLEXION

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ABSTRACT

The unilateral muscle activity of the erector spinae muscles, hip extensors, knee extensors, ankle dorsiflexors and plantarflexors, along with joint articulation kinematics of the ankle, knee, hip and lumbar region in the sagittal plane, were examined as a multi-link system.

The objective was to determine the effects of wearing work boots on joint kinematics with particular emphasis on the lumbar angle formed by the spinous processes of S3-L3-T10.

Seventeen male subjects volunteered to perform specific 'repeated measures' exercises of a material handling nature while wearing properly laced work boots and barefoot with the feet on boot wedges but in an unbound state. Differences in relative angles, and EMG magnitude and timing were examined.

The findings provide considerable understanding of the more global effects of joint restriction caused by the wearing of necessary workplace apparel. Peak amplitude normalized EMG revealed nothing of significance. Time normalized EMG showed that with the grasping of the container's handles, both the multifidus and biceps femoris had significant differences between wedging and booting, both displaying less muscle recruitment with the wedge. Non-normalized EMG demonstrated high degrees of significance in all muscles except the gastrocnemius, again, with the wedge scenario generally demanding less muscle recruitment. The X,Y-values of the centre of mass were examined and there was significance in the Y-value while no significant changes were obtained in the lumbar angle. There were significant differences in the absolute trunk angle (defined as the angle formed by the spinous processes of T10-S3 and the horizontal) and that of the ankle. Although the lumbar angle did not change, the absolute trunk angle decreased significantly with the wearing of laced work boots. This is a result of compensation for the reduced articulation of the ankle. Reduction of the absolute trunk angle increases the torque on the spine which could cause cumulative micro trauma for those individuals having to wear work boots as the mainstay.

The results of this study demonstrate that by externally restricting the articulation of the ankle - foot complex, other joints of the body compensate. If the restriction is in place for the most part, potentially, derogatory side effects could result such as back problems and the low back could become more susceptible to injury. Any research identifying other etiological factors that could be contributing to back pain or injury must be considered as being very relevant.