INFLUENCE OF TRUNK MUSCLE CO-CONTRACTION ON SPINAL CURVATURE DURING SITTING CROSS-LEGGED.

Watanabe S, Kobara K, Ishida H, Eguchi A.
Department of Rehabilitation, Faculty of Health Science and Technology, Kawasaki University of Medical Welfare, 288, Matsushima, Kurashiki City, 701-0193, Japan. susumuwa@mw.kawasaki-m.ac.jp.

ABSTRACT

In Asia, many activities of daily living (ADL) are performed while sitting cross-legged on the floor. This sitting posture rotates the pelvis in a more dorsal direction and lumbar lordosis is more flattened than while sitting on a chair. Sitting cross-legged induces a greater load on the intervertebral discs and spine, especially when in a slumped position that is known to increase disc pressure even more and to aggravate chronic low back pain (CLBP). Therefore, it is very important to instruct Asian people about the correct sitting posture. In addition, it is known that co-contraction of the deep spine-stabilizing muscles enhances lumbar segmental stability and the sacroiliac joint. However, little is known about the influence of co-contraction of the trunk deep muscles on spinal curvature while sitting cross-legged on the floor. The purpose of this study was to compare EMG (electromyographic) activity of the trunk muscles while slump cross-legged sitting with that during co-contraction of the trunk muscles and to investigate how this co-contraction influences spinal curvature. Ten healthy male volunteers (21.7 +/- 2.5 years old) without CLBP participated in the study. Bipolar surface electrodes were attached to the rectus abdominis, the obliquus externus abdominis, the obliquus internus abdominis, the lower back extensor muscles (L3) and the multifidus on the right side. EMG signals were continuously recorded while slump sitting cross-legged and during co-contraction of the trunk muscles. They were amplified, band-pass filtered, digitized and stored by a data acquisition system. The average muscle activity values over the five-second sample for each sitting posture were normalized to maximal voluntary contractions (%MVC). While the subjects performed both sitting postures, the curvature of the spine was measured using a skin-surface and hand-held device, the “Spinal Mouse”. More significant activities of the trunk muscles, with the exception of the rectus abdominis, were observed during co-contraction of the trunk muscles than while slump sitting cross-legged. The co-contraction of the trunk muscles resulted in significantly less thoracic and lumbar curvature and more sacral angle than while slump sitting cross-legged. The results of this study indicated that co-contraction of the trunk muscles while sitting cross-legged could bring about the correct thoracic and lumbar curvature, and effectively stabilize the lumbopelvic region, and decrease focal stress on passive structures.

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