INFLUENCE OF TRUNK MUSCLE CO-CONTRACTION ON SPINAL CURVATURE DURING SITTING FOR DESK WORK.

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ABSTRACT

Nowadays, a lot of office workers are forced to sit at a desk for many hours while doing their jobs. While sitting, the pelvis rotates backwardly, and lumbar lordosis is flattened. At the same time, the load on the intervertebral discs and spine increases. Sitting in a slumped position is known to increase disc pressure even more, and to aggravate chronic low back pain (CLBP). Therefore, it is very important to teach workers about the correct sitting posture. In addition, it has been recognized 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 during sitting for while doing desk work. The purpose of this study was to compare EMG (electromyographic) activity of the trunk muscles during slump 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 during slump sitting and co-contraction of the trunk muscles, simulating a desk work sitting posture; i.e., slightly inclined forward. 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 new 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 during slump sitting. The co-contraction of the trunk muscles resulted in significantly less lumbar curvature and more sacral angle than during slump sitting. The thoracic curvature showed no significant change during either sitting posture. The results of this study indicated that co-contraction of the trunk muscles during sitting while doing desk work could bring about the correct lumbar curvature, and effectively stabilize the lumbopelvic region, and decrease focal stress on passive structures.