



Original Article

Effect of the different ages and visual display terminal use on repositioning and lumbar muscle activity during continuous sitting

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Abstract. [Purpose] The purpose of this study was to investigate the effect of different ages and visual display terminal (VDT) use on repositioning and lumbar muscle activity during continuous sitting. [Subjects] Thirteen males two groups: 7 males in their 20s, 6 males in their 40s participated in this study. [Methods] The two groups watched a lecture in a seated position under different conditions. L4 paraspinal muscle activity was recorded using a surface electromyography system. Repositioning was assessed using a video camera and Tekscan system. [Results] The repositioning times decreased significantly in the order to without a VDT in males in their 20s and 40s > with a VDT in males in their 20s > with a VDT in males in their 40s. The L4 paraspinal muscle activity significantly increased in order to without a VDT in males in their 20s and 40s < with a VDT in males in their 20s < with a VDT in males in their 40s. [Conclusion] The results of this study suggest that the number of repositioning movements during continuous sitting could affect lumbar muscle activity and could be an important factor for prevention of low back pain.

Key words: Low back pain, Seated person, Reposition

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INTRODUCTION

One of the most common postural problems is the slumped sitting posture, which is becoming more prevalent due to the increasing use of computers, TVs, video games, and even backpacks¹⁾. The sitting posture changes within approximately 10 min to a position that allows comfortable working²⁾. Szeto et al.³⁾ attributed changes in muscle patterns principally to personal habitual postures rather than postures dictated by workstations. However, few studies have been performed regarding the clinical meaning of repositioning or affect on trunk muscles in people sitting while using a video display terminal (VDT). So, the purpose of this study was to investigate the effect of different ages and visual display terminal use on repositioning and lumbar muscle activity during continuous sitting.

SUBJECTS AND METHODS

Thirteen males (7 males in their 20s, 6 males in their 40s) with a mean height and weight of 72.5 ± 3.2 cm and 69.1 ± 5.9 kg, respectively, participated in this study. The subjects had no history of musculoskeletal disorders or pain associated with the upper extremity and spine in the past 6 months. The study purpose and methods were explained to the subject, who provided informed consent according to the principles of the Declaration of Helsinki before participating. Muscle activity of the L4 paraspinal was recorded using surface an MP150WSW system (Biopac Systems, Santa Barbara, CA, USA) during 30 minutes of continuous sitting. This study investigated the number of repositioning movements using a video camera and

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Tekscan system (Tekscan, Inc., South Boston, MA, USA) during 30 minutes of continuous sitting. Repositioning movements were counted using the video camera and Tekscan system when the gluteal pressure decreased by more than 20% during movement of the trunk. Data collected by the Tekscan system during the 30 minutes of continuous sitting were analyzed using COMFOMat research 6.20. Two groups (males in their 20s, males in their 40s) watched a lecture in a seated position on a chair under 2 conditions. To ensure that the hips and knees were flexed at 90°, an adjustable-height table and chair with a backrest were used to set the initial sitting posture. Condition 1 was watching a real-time lecture for 30 minutes. Condition 2 was watching a recorded lecture on a 23-inch monitor (visual display terminal) for 30 minutes. SPSS (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The Two-way (2 × 2) repeated measures ANOVA was used to analyze the significance. The alpha level for statistical significance was chosen as 0.05.

RESULTS

The repositioning times decreased significantly in the order to without a VDT in males in their 20s and 40s (30.2 ± 10.4 and 27.9 ± 12.3) > with a VDT in males in their 20s (18.9 ± 11.4) > with a VDT in males in their 40s (14.1 ± 9.0) ($p < 0.05$). The L4 paraspinal muscle activity increased significantly in order to without a VDT in males in their 20s and 40s ($22.6 \pm 11.3\%$ and $25.6 \pm 10.9\%$) < with a VDT in males in their 20s ($30.1 \pm 12.0\%$) < with a VDT in males in their 40s ($34.8 \pm 8.4\%$) ($p < 0.05$).

DISCUSSION

The results showed that L4 paraspinal muscle activity increased significantly in order to without a VDT in males in their 20s and 40s < with a VDT in males in their 20s < with a VDT in males in their 40s. I thought that continuous sitting with VDT was a risk factor for decreased lumbar muscle activity compared with continuous sitting without using a VDT. Within the sagittal plane, habitual poor postures include flexed and relaxed postures⁴). The flexed and relaxed postures are easily adopted by VDT users due to the low muscular effort required in the abdominal muscles, and they result in increased back muscle tension, which can cause an increased load on passive paraspinal passive structures⁴). This result showed that the repositioning times significantly decreased in order to without VDT in 20s and 40s > with VDT in 20s > with VDT in 40s. In contrast, L4 paraspinal muscle activity increased. The interfacial pressure in the gluteal muscles and lower back is dependent on the sitting posture and body positioning⁵). During sitting, the upper body weight is mainly transferred to the ischial tuberosities⁵). Seated persons move frequently to repositioning during continuous sitting. These movements help to reduce the peak pressures transferred to the ischial tuberosities. Vergara, and Page suggested that large changes in sitting posture are indicative of discomfort but that small movements are necessary to alleviate pain caused by static lumbar and pelvic postures⁶). This may indicate that sitting conditions that promote movement are more comfortable. Therefore, the results of this study suggest that repositioning movements during continuous sitting could affect lumbar muscle activity and could be an important factor for prevention of low back pain. The results of this study also showed that L4 paraspinal muscle activity increased significantly in order to with a VDT in males in their 20s < with a VDT in males in their 40s. It also showed that males in their 40s need to reposition more when sitting than males in their 20s.

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