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Comparison of Upper Cervical Flexion and Cervical Flexion Angle of Computer Workers with Upper Trapezius and Levator Scapular Pain

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Abstract. [Purpose] In this study, we compared upper cervical flexion and cervical flexion angle of computer workers with upper trapezius and levator scapular pain. [Subject] Eight male computer workers with upper trapezius muscle pain and eight others with levator scapular muscle pain participated. [Methods] Each subject was assessed in terms of upper cervical flexion angle and total cervical flexion angles using a cervical range of motion instrument after one hour of computer work. [Results] The upper cervical flexion angle of the group with levator scapular pain was significantly lower than that of the group with upper trapezius pain after computer work. The total cervical flexion angle of the group with upper trapezius pain was significantly lower than that of the group with levator scapular pain after computer work. [Conclusion] For selective and effective intervention for neck pain, therapists should evaluate upper and lower cervical motion individually.

Key words: Cervical range of motion, Neck pain, Upper cervical flexion

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INTRODUCTION

Many people spend long hours working at computers, and experience increased work-related neck and shoulder discomfort[1)]. Computer workers commonly complain of pain in the upper trapezius and/or levator scapular muscles[1–3)]. Previous research has shown a positive relationship between activation of the upper trapezius muscle and flexion of the cervical spine muscles during computer operation[3, 4)]. Cervical motion is now considered to consist of upper cervical motion and lower cervical motion[5)]. Increased forward head movement, specifically combined with lower cervical flexion and upper cervical extension, might result in tightness of the cervical extensors as well as increased compressive forces in the articulations of the cervical spine[2, 4)]. Thus, therapists should evaluate upper and lower cervical motion separately in computer workers with neck pain; however, few studies have assessed this. The upper trapezius and levator scapular muscles can become painful after computer work[2, 5)]. These muscles are also important in the treatment of neck pain[2)]. Therefore, the purpose of this study was to compare the upper cervical flexion and cervical flexion angles of computer workers with upper trapezius and levator scapular pain.

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SUBJECTS AND METHODS

Eight male computer workers with upper trapezius muscle pain (21–30 years old; mean height 174.7±3.2 cm; mean weight 65.0±5.9 kg) and eight others with levator scapular muscle pain (21–30 years old; mean height 175.7±4.0 cm; mean weight 67.2±6.6 kg) participated in this study. The upper trapezius and levator scapular pain groups were defined as the subjects with a pressure pain threshold below 6 lb in the respective muscles. A dolorimeter pressure algometer (Fabrication Enterprises, White Plains, NY, USA) was used to measure pressure pain. The dolorimeter consists of a metal probe that can measure pressures up to 20 lb in 0.25 lb increments. A 1 cm^2 rubber plate delivers the pressure of the probe to the body, and the pressure is read on a needle gauge. In this study, the pressure was applied with the dolorimeter at a right angle to the body to measure the pressure pain threshold. All subjects provided their informed consent before participating in the study. This study was approved by the Inje University Faculty of Health Sciences Human Ethics Committee. Each participant was assessed in terms of upper cervical flexion angle and total cervical flexion angle using a cervical range of motion instrument (CROM; Performance Attainment Associates, St. Paul, MN, USA) with two gravity goniometers that was attached to the subject's head. The sagittal- and frontal-plane gravity goniometers measure flexion extension and lateral flexion, respectively. Each participant was seated on a standard folding chair and fitted with the CROM device. For the selective upper cervical flexion angle measurement, a pressure biofeedback unit was placed between the wall and the

subject's lower cervical region (C5–7). In this position, the plastic bag was inflated to a pressure of 20 mmHg during upper cervical flexion motion. The CROM was measured after 1 h of computer work. All subjects performed VDT work for 1 h using the same computer workstation, with the liquid crystal display monitor inclined backward by 20°, the eyes 0.8 m from the monitor, and the top of the monitor 20° below eye level. An adjustable-height table and a chair with no backrest were used to establish the initial sitting posture, to ensure that the hips and knees were flexed at 90°. The subjects performed selected computer work using the program Hansoft. The SPSS software (ver. 18.0, SPSS, Chicago, IL, USA) was used to analyze differences in upper cervical flexion angle and cervical flexion angle between the two groups after computer work using the independent t-test; statistical significance was accepted for values of $p < 0.05$.

RESULTS

The upper cervical flexion angle of the group with levator scapular pain (10.5±3.0 degrees) was significantly lower than that of the group with upper trapezius pain (15.2±2.1 degrees) after computer work ($p < 0.05$). The total cervical flexion angle of the group with upper trapezius pain (52.0±3.2 degrees) was significantly lower than that of the group with levator scapular pain (56.9±4.0 degrees) after computer work ($p < 0.05$).

DISCUSSION

According to our results, the upper cervical flexion angle decreased more in the group with levator scapular pain after computer work. The levator scapular is attached to the posterior tubercles of the transverse processes of C1–4[5]. Thus, tightness or pain in the levator scapular muscle is associated with limitations in upper cervical motion. Our results show that the cervical flexion angle of the group with upper trapezius pain decreased more after computer work. The upper trapezius originates at the external occipital protuberance, the medial third of the superior nuchal line, the ligamentum nuchae, and the spinous process of the seventh cervical vertebra[5]. Thus, tightness or pain in the upper trapezius is associated with total cervical range of motion limitation. In the clinic, therapists typically recommend total cervical range of motion exercises for neck and shoulder pain. However, we suggest that a treatment approach for the upper cervical portion is needed for computer workers with levator scapular muscle pain. Computer workers with upper trapezius pain also need lower cervical motion exercises, because the lower cervical range of motion represents a larger proportion (−70%) of total cervical motion than does upper motion (−30%)[5, 6]. Thus, an intervention or rehabilitation to address limitations in total cervical range of motion must first include an intensive approach for recovery of lower cervical motion. For selective and effective intervention for neck pain, therapists should evaluate upper and lower cervical motion individually. To enable this, researchers should develop a new device such as an upper cervical range of motion measurement tool. A limitation of this study was that we didn't measure the initial cervical angle, so only the difference in cervical range of motion between the two groups could be shown.

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