

## Abstract

**Background:** The round-shoulder posture (RSP) is typified by a protracted, anterior tipped, and downwardly rotated scapular position. One of the common factors that contributes to RSP is weakness of the lower trapezius (LT) and serratus anterior (SA) muscles. Therefore, exercise programs such as scapular posterior tilt exercise (SPTE) is included to activate LT and SA for people with RSP. However people with RSP tend to use upper trapezius (UT). So, the selective activation is needed for effective exercise and visual electromyographic (EMG) biofeedback is known for one of the methods for selective activation.

**Objects:** The purpose of this study was to investigate whether using visual EMG biofeedback can reduce the UT activity while increasing LT and SA activities during SPTE.

**Methods:** Total 24 subjects with RSP (15 males and 9 females) were recruited. The EMG activities of the LT, SA, and UT were collected during SPTE both without and with visual EMG biofeedback conditions. The LT, SA, and UT EMG activities, and the LT/UT and SA/UT EMG activity ratios were analyzed by paired t-test. The significance level was set at  $\alpha=.05$ .

**Results:** The EMG activities of LT and SA significantly increased, and the EMG activity of UT significantly decreased during SPTE with visual EMG biofeedback compared to SPTE without visual EMG biofeedback ( $p<.05$ ).

**Conclusion:** SPTE using visual EMG biofeedback may be an effective method for increasing LT and SA activities while reducing UT activity.

**Key Words:** Biofeedback; Electromyography; Round-shoulder posture; Scapular posterior tilting exercise.