Evaluation of Muscle Strengths and Myoelectric Activities of Scapular Rotators in Patients with Impingement Syndrome

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Abstract

Background: Changes in muscle activities and forces attracted attention during studying shoulder impingement syndrome. **Purpose:** The purpose of this study was to investigate and compare the myoelectric activities and peak isometric muscle forces of scapular rotators in the injured and non-injured sides in patients with unilateral shoulder impingement syndrome. Additionally, the relationship between the changes in myoelectric activities and the changes in peak isometric muscle forces between the injured and non-injured sides were investigated. **Methods:** Twenty-one patients with unilateral shoulder impingement syndrome (mean age 38.68 ± 9.73 years, height 1.66 ± 0.075 m, and weight 77.28 ± 11.36 Kg) participated in the study. The myoelectric activities of the scapular rotators (upper, middle, and lower trapezius and serratus anterior muscles) were measured during active free arm elevation in the scapular plane from 30˚ to 120˚. Additionally, the peak isometric individual muscle force of the scapular rotators was measured using a hand held dynamometer. **Findings:** MANOVAs showed no significant difference in the myoelectric activities of the scapular rotators between both sides ($p = 0.285$). However there was a statistical siginificant difference in the peak isometric forces between both sides ($p = 0.011$). Multiple comparison tests revealed that there were significant decrease in the peak isometric forces of the upper, middle, and lower trapezius ($p = 0.00$, 0.040, and 0.040) respectively in the injured sides compared with the non-injured sides. However, there was non-significant difference in the peak serratus anterior muscle force between both sides ($p = 0.345$). Finally, the bivariate correlations revealed that there was significant weak positive correlation between the changes in the myoelectric activities and the changes in the peak isometric muscle forces of the upper trapezius muscle. **Interpretation:** Based on the previous findings, it may be concluded that patients with shoulder impingement syndrome have abnormal muscle strengths at the scapulothoracic musculature and abnormal neuromuscular integration.

***Keywords*:** Shoulder impingement syndrome; Myoelectric activities; Hand held dynamometer; Scapular rotators