

**ELECTRONIC GUIDE TO THESES APPROVED BY  
DEPARTMENT OF BIOMECHANICS  
PREPARED BY NERVEEN ABD EL SALAM ABD EL KADER AHMED**

**Department of Biomechanics**  
**Master Degree 2011**

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<b>Title</b>	:	<b>Evaluation of isokinetic and myoelectric activities of scapular protractors and retractors in patients with impingement syndrome.</b>
<b>Dept.</b>	:	<b>Department of Biomechanics.</b>
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<b>Degree</b>	:	<b>Master.</b>
<b>Year</b>	:	<b>2011.</b>
<b>Abstract</b>	:	
<p><b>Background:</b> Shoulder impingement syndrome is one of the most common shoulder disorders that have socioeconomic impact on working ability. Several factors such as muscle force and scapular dysfunction are commonly believed to contribute to its occurrence. <b>Purpose:</b> The purpose of the study was to investigate the difference in the isokinetic force and myoelectric activities of scapular protractors and retractors between the injured and noninjured sides in patients with shoulder impingement syndrome. <b>Subjects:</b> Twenty-one patients with unilateral shoulder impingement syndrome (mean age <math>38.68 \pm 9.73</math> years, height <math>1.66 \pm 0.075</math> m, and weight <math>77.28 \pm 11.36</math> Kg) participated in the study. <b>Materials and methods:</b> The isokinetic peak force was evaluated during protraction and retraction at the scapular plane using the Biodex Isokinetic Dynamometer. The mean amplitudes of the myoelectric activities of the three parts of the trapezius muscle and the serratus anterior muscle were measured during protraction and retraction using the Delsys EMG System. <b>Results:</b> Statistical analysis using MANOVA showed significantly lower peak force on the injured side than the noninjured one during protraction and retraction at an angular velocity of <math>60^\circ/s</math> (<math>p &lt; 0.05</math>). Statistical analysis also revealed significantly higher myoelectric activity in the upper trapezius muscle and lower activity in the serratus anterior muscle during retraction in the injured side (<math>p &lt; 0.05</math>). MANOVA also demonstrated insignificant difference in the myoelectric activities of all muscles during protraction (<math>p &gt; 0.05</math>). <b>Conclusion:</b> The presence of weakness in the isokinetic forces of scapular protractors and retractors, and the myoelectric imbalance detected during retraction confirm the role that these muscles play in the development of impingement syndrome and focus our attention on the importance of incorporating their treatment in our rehabilitation protocols.</p>		
<b>Key words</b>	:	<b>shoulder impingement syndrome.</b>
	:	<b>Isokinetic.</b>
	:	<b>scapular protractors.</b>
	:	<b>myoelectric activities.</b>
	:	<b>scapular retractors.</b>
<b>Arabic Title Page</b>	:	<b>تقييم الأنشطة الأيزوكينيتيكية والكهربية العضلية للعضلات الباعدة والمقربة للوحى الكتف عند مرضى متلازمة الانحشار.</b>
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<b>Title</b>	:	<b>Evaluation of muscle strengths and myoelectric activities of scapular rotators in patients with impingement syndrome.</b>
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<b>Degree</b>	:	<b>Master.</b>
<b>Year</b>	:	<b>2011.</b>
<b>Abstract</b>	:	
<p><b>Background:</b> Changes in muscle activities and forces attracted attention during studying shoulder impingement syndrome. <b>Purpose:</b> 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. <b>Methods:</b> Twenty-one patients with unilateral shoulder impingement syndrome (mean age <math>38.68 \pm 9.73</math> years, height <math>1.66 \pm 0.075</math> m, and weight <math>77.28 \pm 11.36</math> 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 <math>30^\circ</math> to <math>120^\circ</math>. Additionally, the peak isometric individual muscle force of the scapular rotators was measured using a hand held dynamometer. <b>Findings:</b> MANOVAs showed no significant difference in the myoelectric activities of the scapular rotators between both sides (<math>p = 0.285</math>). However there was a statistical significant difference in the peak isometric forces between both sides (<math>p = 0.011</math>). Multiple comparison tests revealed that there were significant decrease in the peak isometric forces of the upper, middle, and lower trapezius (<math>p = 0.00, 0.040, \text{ and } 0.040</math>) 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 (<math>p = 0.345</math>). 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. <b>Interpretation:</b> 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.</p>		
<b>Key words</b>	:	<b>Shoulder impingement syndrome.</b>
	:	<b>muscle strengths.</b>
	:	<b>myoelectric activities.</b>
	:	<b>hand held dynamometer.</b>
	:	<b>scapular rotators.</b>
<b>Arabic Title Page</b>	:	<b>تقييم القوى العضلية والأنشطة الكهربائية العضلية للعضلات المدورة للوح الكتف عند مرضى متلازمة الانحشار.</b>
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