

Department of Biomechanics

Master Degree
2006

Author	:	Hossam Eddein Fawaz.
Title	:	Effect of Different Trunk Range of Motion on the Isokinetic Peak Torque Ratio of Trunk Flexor and Extensor Muscles.
Dept.	:	Department of Biomechanics.
Supervisors	1.	Mohamed Fouad Ibrahim Khalil.
	2.	Salam Mohamed EL-Hafez.
	3.	Nagui Sobhi Nassif.
Degree	:	Master.
Year	:	2006.
Abstract	:	<p>The various methods for the interpretation of trunk isokinetic testing data that have been used before are independent on trunk ROM. Therefore, the purpose of this study was twofold. Firstly, to explore the effect of different trunk ROM (First=30°, Second=50° and Third=70°) and different angular velocities (30°/sec and 60°/sec) on the trunk flexor and extensor muscles strength. Secondly, to compare the trunk flexor and extensor muscles strength at each trunk ROM and angular velocity. Thirty healthy male subjects with a mean age of 19.95(±2.56) years, mean weight of 73.73(±6.44) kg and mean height of 175.33(±3.50) cm volunteered to participate in this study. The study was carried out using the Biodex system 3 Isokinetic dynamometer. The subjects were instructed to perform four consecutive trunk flexion and extension at each trunk ROM in the concentric trunk flexors and extensors contraction mode. The test was conducted firstly at 30°/sec angular velocity and secondly at 60°/sec angular velocity with 30 seconds rest in between the two tested velocities. The results of the two way ANOVA with repeated measures showed that there is a significant difference of both different trunk ROM and angular velocity on the trunk flexors and extensors peak torque (PT) values (p<0.05). However, for the trunk flexors/extensors PT ratio a significant difference of different trunk ROM (p<0.05) and a non-significant difference of different angular velocities (p>0.05) were found. In addition, the paired t-test results showed that the peak trunk extensors torque was significantly greater than the peak trunk flexors torque (p<0.05). Also, the findings demonstrated that the trunk flexors PT and the trunk flexors/extensors PT ratio declined with increasing trunk ROM at the two tested velocities. In contrast, the PT values of the trunk extensors at the two angular velocities increased by increasing the trunk ROM. Furthermore, the trunk flexors and extensors at 60°/sec angular velocity had a lower PT values than 30°/sec angular velocity. It can be concluded that this study can help physical therapists to accurately specify the spinal ROM and the angular velocity that can develop maximal trunk muscles strength. In addition, it can be also concluded that the optimal ROM and angular velocity to obtain the highest torque of trunk flexor and extensor muscles were the first trunk ROM using 30°/sec angular velocity and the third trunk ROM using 30°/sec angular velocity respectively.</p>
Key words	1.	Trunk Range of Motion.
	2.	Isokinetic.
	3.	Extensor Muscles.
Arabic Title Page	:	تأثير اختلاف المدى الحركي للجذع علي النسبة بين اقصي عزم ايزوكينيستيكي للعضلات القابضة و الباسطة للجذع.
Library register number	:	1357-1358.

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

Author	:	Manal Samy Ibrahim.
Title	:	Measurement of Ground Reaction Force and Myoelectric Activity during Clutch Pedal Operation in Response to Change of Knee Joint Angle.
Dept.	:	Department of Biomechanics.
Supervisors	1.	Mohamad Fouad Ibrahim Khalil.
	2.	Ghada Mohammad El hafez.
	3.	Salam Mohammad El Hafez.
Degree	:	Master.
Year	:	2006.
Abstract	:	<p>The aim of this study was to investigate the most comfortable knee joint angle having the least electromyography (EMG) activities and the least vertical ground reaction force (VGRF) magnitude during clutch operation when driving a vehicle. Thirty normal female volunteers participated in this study. Their mean age was 19.4 (± 2.7) years, mean height was 159.6 (± 4.4) cm and mean weight was 63.3 (± 9.3) kg. Three knee joint flexion angles were examined; 50°, 60° and 70°. An ergonomically designed clutch pedal was used for experimental purpose. The pedal was placed on the force platform. Each subject was instructed to sit on an experimentally adjustable chair facing the pedal with both feet supported on a 20 cm height footrest. Then each subject was asked to fully depress the clutch by the left lower limb and hold for 5 seconds then release slowly. Results revealed that there was a correlation between higher EMG amplitudes and feelings of discomfort (measured by questionnaire) by decreasing the angle of knee flexion. On the other hand, VGRF magnitude did not differ significantly among the three angles. Based on the previous correlation, it can be concluded that the least comfortable knee joint flexion angle was 50° of flexion. The 70° knee joint flexion angle was uncomfortable to some subjects, while the most comfortable angle was 60°.</p>
Key words	1.	Electromyography.
	2.	Ground Reaction Force.
	3.	Clutch Pedal.
	4.	Knee Joint.
	5.	Comfort Sitting position.
	6.	Vehicle driving.
Arabic Title Page	:	قياس رد فعل الأرض والنشاط العضلي الكهربائي أثناء استعمال دَوَّاسة القابض استجابة لتغيير زاوية مفصل الركبة.
Library register number	:	1291-1292.

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

Author	:	Sobhy Mahmoud Abdel-Wahed Ali.
Title	:	Lower Extremity Flexors and Extensors Isokinetic Testing During Closed Kinetic Chain.
Dept.	:	Department of Biomechanics.
Supervisors	1.	Mohamed Fouad Ibrahim Khalil.
	2.	Salam Mohamed El-Hafez.
	3.	Nagui Sobhi Nassif.
Degree	:	Master.
Year	:	2006.
Abstract	:	
<p>The purposes of this study were to determine the lower extremity flexors/extensors ratio in normal individuals during closed kinetic chain (CKC) isokinetic testing, to investigate the effect of velocity on this ratio, and to investigate the relationship between CKC isokinetic strength variables and the functional performance test. Thirty healthy male subjects with a mean age of 19.8 (± 2.9) years, mean body mass of 72.2 (± 7.4) kg and mean height of 175.1 (± 4.6) cm, volunteered to participate in the study. The CKC testing consisted of concentric isokinetic lower extremity flexion and extension at linear velocities of 24.44, 48.89, and 73.33 cm/sec performed using a Biodex system 3-isokinetic dynamometer. The functional performance test consists of single leg hop for distance test and the best distance hopped was recorded. The main out comes were that the peak force ratios were 0.36 (± 0.06), 0.48 (± 0.12), and 0.60 (± 0.12), at 24.44, 48.89, and 73.33 cm/sec respectively. There was a significant increase in flexors/extensors ratios of peak force ($p < 0.001$) with increased velocity, while total work and average power ratios remained constant around 0.30. Low to moderate direct correlation ($r = 0.1$ to $r = 0.5$ for the flexors and $r = 0.2$ to $r = 0.4$ for the extensors) was reported between CKC isokinetic test and single leg hop for distance test and significant correlation was found at higher velocities. Conclusion: When using this ratio as an evaluative tool, the velocity dependent changes in the flexors/extensors ratio must not be ignored as this may lead to inaccurate evaluations of leg strength. Total work produced and average power generated, were highly relevant measures and were expressed as flexors/extensors ratio which were unaffected by increasing speed. Neither functional testing nor isokinetic tests could be used in isolation to determine both muscle performance and physical function of the lower extremity.</p>		
Key words	1.	Isokinetic.
	2.	Closed Kinetic Chain.
	3.	Functional Performance.
	4.	Lower Extremity.
Arabic Title Page	:	اختبار ايزوكينيتكى لعضلات الطرف السفلي القابضة و الباسطة أثناء السلسلة الحركية المغلقة.
Library register number	:	1355-1356.

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

Author	:	Walaa Sayed Mohamad Mohamad.
Title	:	Electromyographic activities of Quadriceps And Hamstring Muscles During Ascending And Descending Stairs Of Different Heights.
Dept.	:	Department of Biomechanics.
Supervisors	1.	Bassem Galal El-Dein El-Nahass.
	2.	Nagui Sobhi Nassif.
Degree	:	Master.
Year	:	2006.
Abstract	:	
<p>The purpose of this study was to measure and compare the level of myoelectrical activity of the quadriceps and hamstring muscles during ascending and descending stairs of different heights (22.60, 33.60) at the stance phase. Surface EMG of these two muscles was recorded from a group of 30 healthy female subjects with an average age of 20.93 years (± 2.77). The results revealed that, for the quadriceps muscle there was significant difference that existed between the two groups of stair heights and phases of climbing; however there was no significant difference between the two groups of stair heights but between phases for hamstring muscle. It is concluded that the myoelectrical activity of the quadriceps and hamstring muscles is affected by the phase of stair climbing, while the inclination of the stairs affect the myoelectrical activity of the quadriceps muscle only.</p>		
Key words	1.	Myoelectrical.
	2.	Stairs.
	3.	Inclination.
	4.	Quadriceps.
	5.	hamstring.
Arabic Title Page	:	قياس النشاط العضلي الكهربائي للعضلة ذات الأربعة رؤوس وعضلة الفخذ الخلفية أثناء صعود ونزول السلالم ذات الارتفاعات المختلفة.
Library register number	:	1343-1344.