

## Department of Biomechanics

### Doctoral Degree 2000

Author	:	Ghada Mohamed El-Hafez.
Title	:	Triaxial torques of trunk muscles against varying resisted loads in different working conditions.
Dept.	:	Department of Biomechanics.
Supervisors	1.	Mohamed Fouad Ibrahim Khalil.
	2.	Bassel Mohamed Sobhy Tawfik.
	3.	Mohamed Reda Mohamed Awad.
Degree	:	Doctoral.
Year	:	2000.
Abstract	:	
<p>This study was conducted to investigate and analyze the effect of a specific isokinetic training program on the torque exerted by the trunk muscles of subjects working for prolonged times while sitting or standing and suffering from back pain of non-pathological origin. Forty young male subjects suffering from mechanical low back pain aged between 20 and 27 years were investigated. Two groups, namely standing and sitting, were considered. Each subject was evaluated using isokinetic triaxial dynamometer "Iso Station B200" to determine maximum isometric torque (MIT). Dynamic resistance of the training program was based on isometric test results, which were performed at both 25% and 50% of MIT. Each subject received the same isokinetic training program three times per week for four consecutive weeks. The following parameters were measured 1) torque of the trunk muscles, 2) the maximum angular velocity, 3) the range of motion "ROM" and 4) the pain. Results showed that subjects in both groups exhibited a significant improvement in their condition after the treatment program. However, there was a greater increase in the torque obtained in the standing group more than in the sitting group. On the other hand, dynamic maximum velocity was higher in the standing group than in the sitting group. It has also appeared that there was an inverse relationship between trunk ROM and torque. Pain felt at the lumbar region of the spine was significantly reduced at the end of the training programs in both groups, with more relief in the sitting group.</p>		
Key words	1.	Triaxial torques.
	2.	trunk muscles.
	3.	varying resisted loads.
	4.	working conditions.
Arabic Title Page	:	تأثير التدريبات ذات المقاومة الازوكيناتيكية المتغيرة على عزم عضلات الجذع ثلاثي المحور في الأشخاص ذوي الحالات الوظيفية المختلفة.
Library register number	:	712-713.

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

<b>Author</b>	:	Neveen Ibrahim Helal.
<b>Title</b>	:	Effect of long-term exposure to whole body vibration on structural, postural and loading parameters of the lumbar spine.
<b>Dept.</b>	:	Department of Biomechanics.
<b>Supervisors</b>	1.	Mohamed F. Ibrahim Khalil.
	2.	Magdi Ibrahim Basioni.
	3.	Mohamed A. Mounir Islam.
<b>Degree</b>	:	Doctoral.
<b>Year</b>	:	2000.
<b>Abstract</b>	:	<p>The purpose of this study was to detect the effect of long-term exposure to whole body vibration (WBV) on the measurements of bone mineral density (BMD) of the lumbar vertebral bodies, the roentgenographic measurements of the lumbar curve angle and the sacral inclination angle, In addition, to determine if there is any effect of WBV on the loading pattern of the lumbar spine through calculating the axial as well as the shear forces and the axial pressure on each discrete lumbar segment (vertebral body and inter-vertebral disc). Finally, to report any associated radiological deviations occurring as a result of this exposure. The study was delimited to 20 agricultural tractor drivers and 20 control subjects. The bone mineral density of the upper four lumbar vertebral bodies was measured for the drivers group only using DXA Hologic QDR 2000 and compared the standard control values a comparison that showed a significant reduction in the BMD level of the drivers from the standard values. Two X-ray films were obtained for each subject in both groups. The lumbar curve angle (LCA) and the sacral inclination angles (SIA) were measured on their lateral roentgenograms and compared between groups. The result of this comparison revealed a non-significant difference existed neither in the LCA nor in SIA with a strong relationship existed between the two variables. The relative inclination angles of the vertebral bodies and the inter-vertebral discs were measured and introduced together with the share of the trunk by weight into a mathematical model. When the calculated compressive and the shear forces on each vertebral body and inter-vertebral disc in the lumbar region were compared between groups it was found that there was no significant difference between the two groups. On the other hand when the surface areas as well as the calculated axial pressure of each discrete segment were compared between the two groups they revealed a significant difference. It was also found that, the long-term exposure to WBV increased the risk of low back pain, incidence of spinal degenerative changes, vertebral fractures, and postural deviations mainly scoliosis.</p>
<b>Key words</b>	1.	Long-term exposure.
	2.	Body vibration.
	3.	Structural.
	4.	Postural.
	5.	Loading parameters.
	6.	Lumbar spine.
<b>Arabic Title Page</b>	:	تأثير تعرض الجسم للاهتزازات الميكانيكية لمدة زمنية طويلة على الفقرات القطنية من الناحية التركيبية و الميكانيكية و القوام.
<b>Library register number</b>	:	716-717.

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

Author	:	Salam Mohamed El-Hafez.
Title	:	Noninvasive quantitative angular measurement of foot arches among normal and flat foot individuals.
Dept.	:	Department of Biomechanics.
Supervisors	1.	Nadia Abd El-Azim Fayyaz.
	2.	Abd Alla Sayed Ahmed Mohamed.
	3.	Ahmed Salah Derbala.
Degree	:	Doctoral.
Year	:	2000.
Abstract	:	<p>This study was conducted to quantify the magnitude of the foot arches (medial, lateral and transverse ) in normal and flat foot individuals using noninvasive method which was the flexible curve. In addition the study investigated the reliability of this noninvasive tool in measuring the foot arch . This was achieved by using an invasive method ( X-ray ) . Seventy normal subjects and fifty flat foot subjects were chosen for the noninvasive measurement. For the invasive measurement , thirty normal and thirty flat for individual were selected and then the medial longitudinal and lateral longitudinal arches (MLA and LLA ) of the foot were measured in both groups in weight bearing ( WB ) and non-weight bearing ( NWB ) conditions . THE ANGLES ( <math>\theta</math> ) and the curvature ( K ) of each arch were recorded for each group and each condition . the results of the first part of the study ( flexible curve ) concluded that the mean value of the MLA in the right and left feet were <math>67.8^\circ</math> and <math>63.7^\circ</math> respectively . For the LLA these values were ( <math>58^\circ</math> and <math>54.9^\circ</math> ) and the transverse arch mean values were ( <math>41.3^\circ</math> and <math>40.4^\circ</math> ) for the normal group . In the flat foot group these values were <math>45.4^\circ</math> and <math>41.5^\circ</math> in the MLA , <math>43.88^\circ</math> and <math>41.7^\circ</math> in the LLA and <math>34.12^\circ</math> and <math>34.12^\circ</math> and <math>30.38^\circ</math> in the TA for the right and left foot respectively . The second part of the study ( X-ray ) indicated that the mean theta and curvature of the MLA for the normal group showed no significant change in its value between the WB and the NWB condition . In the flat foot group the MLA decreased significantly in the WB condition compared with the NWB condition. In the LLA the theta showed no significant change between the WB and NWB condition in the normal group . In the flexible flat foot subjects, there was no significant difference in the theta either in WB or in NWB conditions . That was not surprising because the LLA is not involved in the flat foot as the flexible flat foot shows its defect in the MLA . As regarding the reliability of using the flexible curve in measuring the foot arches , the results of this part of the study concluded that the flexible curve was not a reliable method in measuring the foot arch as compared to a more reliable method ( X-ray ) .</p>
Key words	1.	Noninvasive quantitative.
	2.	angular measurement.
	3.	foot arches.
	4.	flat foot.
Arabic Title Page	:	القياس الكمي الغير متداخل لزوايا اقواس القدم عند الاشخاص الاصحاء و الاشخاص ذوي الاقدام المسحاء.
Library register number	:	732-733.