

## Department of Biomechanics

### Doctoral Degree 2006

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<b>Title</b>	:	<b>Energy expenditure in normal subjects of different body height and individuals with lateral ankle instability.</b>
<b>Dept.</b>	:	<b>Department of Biomechanics.</b>
<b>Supervisors</b>	1.	<b>Mohamed Fouad Ibrahim Khalil.</b>
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<b>Degree</b>	:	<b>Doctoral.</b>
<b>Year</b>	:	<b>2006.</b>
<b>Abstract</b>	:	
<p>The aim of the study was to identify the relationship between different body height and energy expenditure, and to determine how much lateral ankle instability increases the energy expenditure. Seventy eight volunteers participated in the study. They were divided into three groups, group (A) consisted of 26 subjects with body height of 165-174 cm and mean height of 169.5 cm (<math>\pm 3.3</math>) and mean weight of 69.8 kg (<math>\pm 11.1</math>), group (B) consisted of 26 subjects with body height of 175-185 cm and mean height of 179.5 cm (<math>\pm 3.4</math>) and mean weight of 80.5 kg (<math>\pm 12.4</math>), and group (C) consisted of 26 subjects suffering from chronic lateral ankle instability their body height was 165-185 cm and mean height was 174 cm (<math>\pm 7</math>) and mean weight of 75.35 kg (<math>\pm 13.7</math>). Each subject walked on the treadmill at two speeds 3.5 km/h and 5 km/h for three minutes with resting period of twenty minutes between the two tests. Before each test there was 3 minutes of warm up at 1.5 km/h, and after each test there was 3 minute of recovery at 1.5 km/h. The oxygen consumption, ventilation minute, energy expenditure, and energy expenditure index at the two speeds are measured by using ZAN 100 flow handy II medical device with a PC- connected to open spirometry system, and external pulse meter. Results revealed that there is no significant difference in energy expenditure and oxygen consumption between the three groups at 3.5 km/h. At speed 5 km/h there is no significant difference between group (B) (175-185 cm) and group (A) (165-174 cm) in oxygen uptake, but oxygen uptake of group (C) CAI is higher than group (A) and (B), rather than energy expenditure of group (C) CAI is higher than group (A) only but equal to group (B) that due to ANOVA test of weight revealed that group (B) has significant heavier weight than group (A) and (C).</p>		
<b>Key words</b>	1.	<b>Energy Expenditure.</b>
	2.	<b>Oxygen Consumption.</b>
	3.	<b>Body Height.</b>
	4.	<b>Chronic Ankle Instability.</b>
<b>Arabic Title Page</b>	:	الطاقة المستنفذة عند الاشخاص الاصحاء مختلفى الاطوال والاشخاص الذين يعانون من عدم ثبات مفصل الكاحل من الخارج.
<b>Library register number</b>	:	<b>1419-1420.</b>

**ELECTRONIC GUIDE TO THESES APPROVED BY  
DEPARTMENT OF BIOMECHANICS  
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<b>Title</b>	:	Effect of flexible and semi rigid lumbosacral supports on the loads of the lumbar spine at different trunk positions.
<b>Dept.</b>	:	Department of Biomechanics.
<b>Supervisors</b>	1.	Mohamed Fouad Ibrahim.
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<b>Degree</b>	:	Doctoral.
<b>Year</b>	:	2006.
<b>Abstract</b>	:	
<p>This study was conducted to investigate the effect of two types of lumbosacral belts on different radiographic and mathematical measurements of the lumbar spine in neutral standing and in 60 degrees trunk flexion. Forty healthy males with age ranged from 20 to 35 years participated in the study. Three lateral radiographs for the spine, from T12-S1, were taken for each subject in each of the study positions. The first radiograph was taken while the subject without belt, the second and third radiographs were taken while the subject was wearing flexible belt and semirigid belt. Hand held goniometer was used to obtain the 60 degrees trunk bending position. From the radiographs, vertebral inclination angles, disc inclination angle from T12-S1 were measured and fed in a 2dimensional model to calculate the shear and compressive forces on each lumbar disc then these forces were normalized with respect to the body mass of each subject. The results showed that, in neutral standing, there was significant decline of the disc inclination angles toward the cephalic direction from L5-S1 to L1-L2 discs without a significant difference between conditions, (<math>P&gt;0.05</math>). In 60° trunk flexion, both types of belts reduced the disc inclination in the lower lumbar level while it increased the inclination in the upper levels toward the kyphosis. These results were quantified by calculating the amount of disc inclination while moving from standing to 60° trunk flexion that showed statistically significant reductions of the angles of disc inclination in the lower lumbar levels with significant increase in the disc inclination angles of the upper levels, at <math>P&lt;0.05</math>. Analysis of the normalized shear and compressive forces revealed that there was no significant difference between all conditions on any of the disc levels except that on L5-S1 disc as in standing, normalized shear showed significant reduction in both belt conditions, while in bending there was a significant increase in the normalized compressive values while using the two types of belt. From these results, it was concluded that both types of belts did not change the alignment of the lumbar spine in standing position but they changed the pattern of lumbar intervertebral disc inclination during 60 degrees trunk flexion. In addition, both types of belts have reduced the normalized shear on L5-S1 disc in standing position and so, both belts could be recommended to prevent the shear injuries and to relieve the shear stresses for patients with spondylolithesis.</p>		
<b>Key words</b>	1.	lumbar spine.
	2.	mechanics.
	3.	belts.
	4.	loads.
	5.	trunk bending.
<b>Arabic Title Page</b>	:	تأثير السندات القطنية العجزية المرنة والمتوسطة الصلابة على احمال العمود الفقري في اوضاع مختلفة للجذع.
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