

## Department of Biomechanics

### Doctoral Degree 2011

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<b>Title</b>	:	<b>Ground Reaction Force and Foot Pressure Changes with Different Floor Materials during Barefoot and Shod Walking.</b>
<b>Dept.</b>	:	<b>Department of Biomechanics.</b>
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<b>Degree</b>	:	<b>Doctoral.</b>
<b>Year</b>	:	<b>2011.</b>
<b>Abstract</b>	:	
<p>Studying the biomechanical gait alterations; as changes in step length, speed and angle of foot placement, during walking on different floor materials has been an interesting field of study. The purpose of this study was to explore the effect of changing the floor material on the ground reaction force and the foot pressure distribution during barefoot and shod walking. The heel strike transient and the peak pressures at the heel and big toe were recorded in thirty healthy male subjects during barefoot and shod walking on four different floor materials; “ceramic”, “wood”, “vinyl” and “none”. The mean age of participants was 21.3 years (<math>\pm 1.3</math>), mean weight was 69.8 Kg (<math>\pm 9.9</math>) and mean height was 172.2 cm (<math>\pm 7.0</math>). Motion Analysis System “Qualisys” was used to collect the ground reaction force data while the “MatScan” plantar pressure system was used to collect the peak pressures at the heel and big toe. Results revealed that there was a non-significant difference among the four floor materials for the heel strike transient, peak pressure at the heel and peak pressure at the big toe during barefoot walking. However for the heel strike transient, results revealed that there was a significant difference among the four floor materials during shod walking. Also, the mean value of the heel strike transient was significantly lower during barefoot than shod walking. It was, thus, concluded that the floor material may not alter the heel strike transient or the peak pressures at the heel and big toe regions during barefoot walking. Meanwhile, the heel strike transient might be affected when the floor material is changed during shod walking. The degree of compliance of the flooring and/or the shoe soling might have a more profound effect on altering the ground reaction force and the foot pressure distribution in healthy individuals than the material of the floor alone.</p>		
<b>Key words</b>	:	<b>Ground reaction force.</b>
	:	<b>foot plantar pressure.</b>
	:	<b>floor materials.</b>
	:	<b>heel strike transient.</b>
<b>Arabic Title Page</b>	:	<b>تغيرات قوة رد فعل الأرض و ضغط أسفل القدم مع اختلاف مادة الأرضيه أثناء المشى حافى القدمين و بالحداء</b>
<b>Library register number</b>	:	<b>2675-2676.</b>

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

<b>Author</b>	:	Sobhy Mahmoud Abdel-Wahed Aly.
<b>Title</b>	:	Evaluation of Neuromuscular Changes Following Anterior Cruciate Ligament Reconstruction.
<b>Dept.</b>	:	Department of Biomechanics.
<b>Supervisors</b>	:	Alaaddin Abdel-Hakim Balbaa.
	:	Ahmed Abdel-Aziz.
	:	Nagui Sobhi Nassif
	:	Ahmed Yousry Radwan.
<b>Degree</b>	:	Doctoral.
<b>Year</b>	:	2011.
<b>Abstract</b>	:	
<p>The purpose of this study was to investigate the effect of ACL reconstruction on neuromuscular performance of the knee muscles six months following reconstruction. Isokinetic peak torque, time to peak torque, and myoelectric activities of knee flexors and extensors were compared between the operated side and the non-operated side in patients following ACL reconstruction with age and activity matched control group. Twenty patients with ACL reconstruction using semitendinosus and gracilis autograft (mean age <math>21 \pm 2.8</math> years, weight <math>73 \pm 8.6</math> kg, and height of <math>171.9 \pm 4.2</math> cm) were compared with twenty healthy male subjects (mean age <math>21.4 \pm 1.8</math> years, weight <math>75.1 \pm 7.1</math> kg, and height of <math>174.3 \pm 5.2</math> cm). Biodex Isokinetic dynamometer (system 3) was used in synchronization with the Noraxon 1400A EMG apparatus to record the isokinetic and EMG data at angular velocities of <math>60^\circ/s</math> and <math>180^\circ/s</math>. Contraction mode was set at concentric extensors/concentric flexors and eccentric flexors/eccentric extensors. Results showed that the operated limb improved when compared with the non-operated one but when compared with control group significance differences appeared. Knee flexors were affected more than knee extensors and the eccentric deficits were larger than concentric deficits. The significant weakness of the knee extensors is most apparent under eccentric mode at <math>180^\circ/s</math>; and the significant weakness of knee flexors is most apparent under eccentric mode at both <math>60^\circ/s</math> and <math>180^\circ/s</math>. For myoelectric activities, the Hamstring (H) and Vastus Lateralis (VL) appeared to be the most affected muscles. In addition, there was a significant difference between the non-operated side and the control group. Conclusion: ACL reconstruction has significant effect on neuromuscular performance of knee extensors and flexors that persisted six months following reconstruction. Alteration in neuromuscular performance was not limited to the operated side only but extended to the contralateral side. Contralateral limb strength should not be used as end goal of rehabilitation. Specificity of velocity and contraction mode should be considered in evaluation. Based on the outcomes of the current accelerated rehabilitation program, it can be concluded that six months following ACL reconstruction is not the safe time to return to full sport activities.</p>		
<b>Key words</b>	:	ACL reconstruction.
	:	EMG.
	:	Neuromuscular performance.
	:	Isokinetic.
	:	Knee joint.
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