ALTERED KINEMATICS, KINETICS AND EMG ACTIVITY IN SUBJECTS WITH FUNCTIONAL INSTABILITY (FI) OF THE ANKLE JOINT DURING A SINGLE LEG DROP JUMP

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INTRODUCTION: In sports such as basketball the incidence of FI (recurrent sprain and feelings of "giving way" of the ankle joint) following lateral ankle sprain has been shown to exceed 70% (Yeung et al., 1994). To date no study has investigated simultaneously lower limb 3D kinematics, kinetics and ankle joint muscle activation during a jump landing technique in subjects with FI of the ankle joint.

METHODS: Testing was carried out on a group of subjects with FI (n=24) and a control group (n=24) with no history of lower limb injury. Subjects stood on a 35cm high platform with the test leg relaxed and non-weight bearing. The subject then used the contralateral leg to propel him/herself from the platform and land on the test leg on the centre of a Bertec force plate. Each subject performed 10 repetitions during which 3D joint angular displacements were measured and recorded (200Hz) using the CODA mpx30 3D motion analysis tracking system (Charnwood Dynamics Ltd., UK), while surface EMG was collected from the rectus femoris, peroneus longus, tibialis anterior and soleus muscles.

RESULTS: FI subjects showed a significant decrease in pre-initial contact (IC) peroneus longus IEMG ($p<.01$) as well as a more inverted position of the ankle joint during the same time period ($p<.05$). During the time period from 90ms – 200ms post-IC FI subjects had a less dorsiflexed position of the ankle joint ($p<.05$). FI subjects had an increase in the time averaged vertical and posterior components of GRF during the time period 35ms – 60ms post-IC and 75ms – 90ms post-IC respectively ($p<.05$). FI subjects reached their peak vertical and posterior GRFs earlier than control subjects (60ms post-IC *vs* 75ms post-IC) and (85ms post-IC *vs* 115ms post-IC) respectively ($p<.01$).

DISCUSSION: It is evident from our results that the decrease in peroneal longus activity prior to the expected IC with the ground leaves the ankle joint in a vulnerable position (i.e. more inverted position) and any unanticipated ground contact could cause a hyperinversion injury. The altered GRFs could lead to undue stress being transmitted to the articular surfaces and supporting ligaments, resulting in repeated injury and consequent damage to ankle joint structures.

CONCLUSION: The results observed in this study are not without consequence in terms of potential repeated injury to the functionally unstable ankle joint.

REFERENCES:

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