

## COMPARISON OF KNEE JOINT MOMENTS DURING ANTICIPATED AND UNANTICIPATED RUNNING AND CUTTING MANEUVER - A PILOT STUDY

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**KEY WORDS:** knee injury, lower extremity.

**INTRODUCTION:** Knee joint injuries are common in sports activities. Because it is understood that non-contact ACL injuries most often occur during cutting or landing tasks, biomechanical studies have examined in lower extremity kinematics. Cutting maneuvers during sporting are not always anticipated, and usually occur as a sudden reaction to an external stimulus. Therefore, the purpose of this study was to compare the joint moments in the lower extremity of females during anticipated and unanticipated running and cutting manoeuvres.

**METHOD:** Eight healthy young females participated ( $21.4 \pm 1.3$  yrs;  $1.61 \pm 0.07$  m;  $57.8 \pm 10.6$  kg). Motion video and the ground reaction force were collected. Participants performed the anticipated and unanticipated straight ahead running and  $45^\circ$  cutting maneuver. A direction indicator board was used to provide visual cue of the desired task. For the unanticipated condition, a direction arrow was turned on just before reaching a force plate so that the participant could decide which task to perform.

**RESULTS:** Table 1 presents a summary of peak knee joint moments. In general, the unanticipated cutting task demonstrated significantly greater peak knee abductor moment than the anticipated condition. Likewise, the unanticipated cutting task demonstrated significantly greater peak knee abductor moment than the straight ahead running task. Also, cutting task demonstrated significantly greater peak knee internal rotation moment than the running task.

**Table 1 Average (S.D.) peak knee joint moments**

Variable (Nm/kg)	RUN		CUT	
	Anticipated	Unanticipated	Anticipated	Unanticipated
Flexion	2.87 (0.7)	2.95 (0.8)	2.96 (0.7)	2.89 (0.8)
Abduction	0.08 (0.1)	0.09 (0.1)	0.32 (0.4)	0.52 (0.4) <sup>* †</sup>
Internal rotation	0.10 (0.1)	0.08 (0.1)	0.97 (0.4) <sup>†</sup>	1.02 (0.3) <sup>†</sup>

\* Significant difference between the anticipated and unanticipated conditions

† Significant difference between the straight ahead run and cutting maneuver

**DISCUSSION:** The results of this study showed that during stance phase, unanticipated cutting task demonstrated a significantly greater peak knee abductor moment than anticipated cutting task. It was reported that the potential for increased loading on the ACL during cutting maneuver is a result of the large increase in abduction and internal rotation (Besier et al., 2001). Therefore, given the large increase in abductor moment with increased rotation moment in the unanticipated condition, the potential for non-contact knee ligament injury when performing cutting maneuver in an unanticipated sporting situation becomes apparent. The findings of this study suggest that anticipation affects frontal plane kinetics in knee joint during cutting tasks. Further investigation will reveal the exact nature of the postural adjustment strategies and their effect on external loads applied to the knee.

### REFERENCES:

Besier, T. F., Lloyd, D. G., Cochrane, J. L. & Ackland, T. R. (2001). External loading of the knee joint during running and cuttings. *Medicine & Science in Sports & Exercise*, 33, 1168-1175.