EFFECTS OF BANKED-CURVES ON ANKLE AND KNEE KINEMATICS DURING RUNNING

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INTRODUCTION: The biomechanics of running on level surfaces have been extensively researched, but the knowledge is limited related to the biomechanical adaptations resulting from running on irregular terrain and their potential association with injury. The rate of running injuries has been shown to be greater in indoor versus outdoor track running (Lanese et al. 1990, Lysholm et al. 1987, Beukeboom et al. 2002). The purpose of this study is to estimate the effects of an indoor-banked curve on the knee and ankle kinematics adaptations of running in young healthy individuals.

METHOD: Ten elite runners will be selected for this study. The study will use a within subject design with repeated measures. A 3-way ANOVA for repeated measures with the following 3 factors: inclination of track, speed and body side will be used for analysis. Knee and ankle kinematics will be measured for all subjects while running on leveled and banked curves at controlled speeds (1.4 m/s, 3.8 m/s, and 7.0 m/s). Angular displacement for the ankle and knee will be collected with electrogoniometers (XM 110 Penny & Giles, UK). The temporal measurements will be obtained from two on/off foot switches. Intra-rater reliability and validity will be determined from pilot testing.

RESULTS AND DISCUSSION: Knee and ankle kinematics of banked-curve running are expected to resemble running kinematics of individuals with leg length discrepancies. We are expecting a difference between knee flexion at mid-stance of about 5-10 degrees. For the ankle, we expect to see increases in eversion for the outside ankle and increased inversion for the inside ankle by 5-10 degrees for slow curved running to as much as 20 degrees for fast curved running.

CONCLUSION: A the rate of running injuries has been shown to be different in indoor versus outdoor track running (Lanese et al. 1990, Lysholm et al. 1987, Beukeboom et al. 2002), there may be a relationship with the configuration of indoor tracks and the incidence of lower limb injuries. Prevention programs may include modifications of training habits like changing direction after a certain number of laps or actually limiting the amount of training time on the inclined curves.

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