

## **The Effects of Chronic Pain Levels on Joint Angle During Jump Landing/Cutting in Individuals with Chronic Ankle Instability**

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### **ABSTRACT**

About 60% of chronic ankle instability (CAI) individuals report ankle pain persisting for longer than 3 months. They have the risk of recurrent ankle sprains while performing multiplanar tasks such as jumping with landing/cutting. However, little is known about the effects of chronic pain levels on joint kinematics differences and how chronic pain levels contribute to motor outcomes when performing multiplanar motions.

**PURPOSE:** To identify the effects of pain levels on kinematics during jump landing/cutting in CAI individuals.

**METHODS:** This study was a cross-sectional study. Twenty CAI patients with high pain (high pain) (9 males, 11 females; age=22±2year; height=1.74±0.10m; mass=79.4±14.6kg, pain=67.4±7.7), 20 CAI patients with low pain (low pain) (9 males, 11 females; age=21±3year; height=1.73±0.08m; mass=74.2±12.7kg, pain=91.7±3.9), and 20 healthy controls (9 males, 11 females; age=22±1year; height=1.74±0.09m; mass=68.2±10.2kg, pain=100±0). We followed the International Ankle Consortium criteria for classifying CAI and utilized the Foot and Ankle Outcome Scores for chronic pain levels. We used 44 reflective markers to calculate joint angles collected during the jump landing/cutting task from initial contact to toe-off (0-100% of stance). Functional analyses of variance were used to evaluate between-group differences for kinematics outcomes. **RESULTS:** The high pain showed 4.8° less plantarflexion from 0-12% than the low pain from 0-8% and 4.9° less plantarflexion than the healthy control. The high pain exhibited 1.4° less inversion from 8-12% than the low pain. The knee joint presented 1.5° less flexion from 0-5% and then 4.4° more flexion at 10-24% than healthy controls, showing a greater knee joint angle variability. The high pain showed 5.3°, 3.6°, and 3.5° higher hip flexion from 2-24%, 50-61%, and 75-82%, respectively than the healthy control.

**CONCLUSION:** The high pain demonstrated less plantarflexion and inversion in the ankle while exhibiting more kinematics variance in the knee joint and hip during multiplanar tasks. These findings may result in a stiffer landing in the ankle and proximal landing strategy during jump landing/cutting tasks. Thus, chronic pain levels affect joint kinematics during multiplanar tasks.