The Relationship Between Concussion History and Lower Extremity Biomechanics During a Land and Cut Task

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ABSTRACT

In high impact landing tasks, athletes with a history of sports related concussion (SRC) have been found to demonstrate lower extremity (LE) biomechanics that are associated with elevated injury risk. However, the exact relationships between SRC history and LE biomechanics are inconclusive. **PURPOSE**: The purpose of this study was to investigate the relationship between SRC history and LE biomechanics during a cutting task. **METHODS**: A cohort of athletes with a history of SRC (n=20) and a control group of healthy athletes (n=20) were recruited for this study. The control group were matched by age, sex, and sport. Athletes performed an unanticipated land and cut task. Athletes stood on a 60 cm box and focused on a visual light positioned three meters away from them. The light displayed green, pink, blue, or red. Athletes were instructed to step off the box, land on both limbs, and perform a 45-degree cutting maneuver to left or right when they saw red or green light respectively. A point biserial correlation was conducted correlating group (0 = control, 1 = SRC) with the following dependent variables: dominant limb ground reaction force (D_GRF), dominant limb ankle dorsiflexion angle (D_DF), dominant limb knee flexion angle (D_KFA), dominant limb knee flexion moment (D_KFM), dominant limb knee abduction angle (D_KAA), and dominant limb knee abduction moment (D_KAM). A linear regression equation was obtained for any significant correlations. **RESULTS**: There was a small significant negative correlation between group and KFA ($r = -.342$, $p < .01$). There were no other significant correlations between group and LE biomechanical variables ($p > .05$). A linear regression analysis showed SRC history as a significant predictor of KFA (KFA = 60.24 - 6.16(group); $R^2 = 0.117$, $p = .03$). **CONCLUSION**: The SRC group was associated with lower KFA. According to our regression analysis, athletes with an SRC history had predicted a 6.2 degree decrease in KFA compared to the control group during the land and cut task. Furthermore, approximately 12% of the variance in KFA can be explained by SRC. This suggests that previously concussed athletes may be at a higher risk for LE injury. Further research in this area is needed to confirm this relationship