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A Three-Dimensional Kinematic and Kinetic Study of the College-Level Female Softball Swing

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ABSTRACT

This paper quantifies and discusses the three-dimensional kinematic and kinetic characteristics of the female softball swing as performed by fourteen female collegiate amateur subjects. The analyses were performed using a three-dimensional computer model. The model was driven kinematically from subject swings data that were recorded with a multi-camera motion analysis system. Each subject used two distinct bats with significantly different inertial properties. Model output included bat trajectories, subject/bat interaction forces and torques, work, and power. These data formed the basis for a detailed analysis and description of fundamental swing kinematic and kinetic quantities. The analyses revealed that the softball swing is a highly coordinated and individual three-dimensional motion and subject-to-subject variations were significant in all kinematic and kinetic quantities. In addition, the potential effects of bat properties on swing mechanics are discussed. The paths of the hands and the centre-of-curvature of the bat relative to the horizontal plane appear to be important trajectory characteristics of the swing. Descriptions of the swing mechanics and practical implications are offered based upon these findings.

Key words: Softball, Sport Biomechanics, Softball Bat, Softball Swing, Kinematics, Kinetics

Key Points

- The female softball swing is a highly coordinated and individual three-dimensional motion and subject-to-subject variations were significant in all kinematic and kinetic quantities.
- The paths of the grip point, bat centre-of-curvature, CG, and COP are complex yet reveal consistent patterns among subjects indicating that these patterns are fundamental components of the swing.

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