

THE RELATIONSHIP BETWEEN GLUTEAL ACTIVITY AND PELVIC KINEMATICS DURING THE WINDMILL SOFTBALL PITCH

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INTRODUCTION: Historically a number of pitch delivery methods have been used, with the windmill pitching motion becoming the most common and accepted pitch delivery method in recent years. Although millions of girls participate in softball, there are few studies investigating the mechanics of the windmill softball pitch. Thus, the purpose of this study is to quantify the activity of the gluteus maximus and gluteus medius on the dominant side; and to further determine if an increase in gluteal activity throughout each phase results in an increase of linear velocity of the pelvis at phase endpoint.

METHOD: Anthropometric data will be collected on softball pitchers' upper and lower extremity and torso specifically for this study: length, width, diameter, and circumference of the torso, dominant thigh, knee, shank, and ankle using a standard anthropometric kit (Rosscraft Innovator Inc). Electromyographic (EMG) data will be collected using a previously established protocol (Cram, & Kasman, 1998) with electrodes placed on both the gluteus maximus and gluteus medius. After placement of electrodes, manual muscle tests will be conducted to obtain maximum voluntary contractions so as to provide a baseline for each subject. Kinematic data will be collected using The Motion Monitor® system (Innovative Sports Training, Chicago, IL) and throwing kinematics will be calculated using the International Society of Biomechanics recommendations for reporting joint motion. The joint coordinate system will be defined by previously established protocol (Wu et al. 2005). Once the data are reduced, Pearson Product Moment Correlation Coefficients will be calculated to determine the strength of the relationship between gluteal activity and pelvic kinematics during the windmill softball pitching motion.

RESULTS: We will use the five phases of pitching based on Maffet et al. (1997) as illustrated in Figure 1.

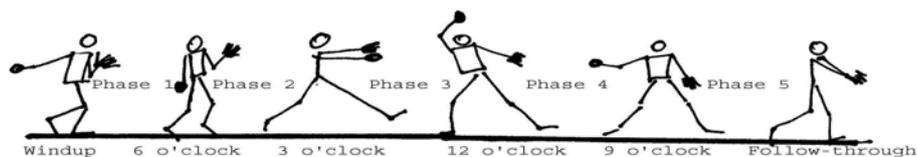


Figure 1. Phases and instances in time for the windmill softball pitch.

DISCUSSION/CONCLUSION: We anticipate that increases in dominant gluteus maximus and gluteus medius muscle activity during each phase will be positively correlated to the linear velocity of the pelvis at phase endpoint for each of the four instances in time (6 o'clock, 3 o'clock, 12 o'clock, and 9 o'clock).

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