GROUND REACTION FORCE ANALYSIS OF SOFTBALL WINDMILL PITCH

Jia-Hao Chang, Wei-Ming Tseng*, Jiang-Song Tseng, and Shiuan-Lin Huang*

Department of Physical Education, *Institute of Exercise and Sports Science, National Taiwan Normal University, Taipei, Taiwan

KEY WORDS: push-off, landing, lower extremity

INTRODUCTION: The lower extremity provides supports when we exercise. The roles what lower extremity plays should be clarified during pitching. Therefore, the purpose of the current study was to observe the ground reaction force during a windmill pitcher pitching straight ball and rise ball.

METHOD: Five healthy female windmill pitchers (age: 18±1.6 years, height: 167±6.4 cm, and weight: 66±9.5 kg) participated in the study. A force platform (Kistler 9281 type, 60×90-cm) sampling at 1000Hz was used to collect the push-off and landing force while the pitcher pitching the straight and rise ball in the laboratory. Three pressure sensors placed on throwing finger, tiptoe, and heel of each subject were also used to define the timing of ball releasing, leg push-off and landing, respectively, in the pitching cycle.

RESULTS AND DISCUSSION: Table 1 showed the ground reaction forces of push-off and landing when the pitcher threw straight and rise ball. The data was normalized by the subject's body weight for comparison between subjects. The peak forces of push-off and landing in vertical direction resulted from this study were similar to the data of the literatures. On the supported leg, the values of ground reaction force in vertical, propulsive/braking, and medial/lateral directions were similar between straight and rise ball. However, throwing straight ball had bigger values of medial/lateral force on landing leg than throwing rise ball did.

Table 1 Ground reaction force (BW)

Ground reaction force components	Push-off		Landing	
	Straight	Rise	Straight	Rise
Vertical	1.36±0.12	1.32±0.16	3.04±1.21	3.19±1.19
Propulsive(+)/braking(-)	0.44±0.15	0.43±0.13	-1.63±0.63	-1.37±0.65
medial(+)/lateral(-)	0.15±0.03	0.15±0.03	0.45±0.15	0.46±0.08

CONCLUSION: The ground reaction forces had no differences between straight and rise ball.

REFERENCE:

MacWilliams, B.A., Choi, T., Perezous, K.M., Chao, S.E., & MacFarland, G.E. (1998). Characteristic ground-reaction force in baseball pitching. *The American journal of sports medicine*, 26, 66-71.