

# BIOMECHANICS AND POTENTIAL INJURY MECHANISMS OF WRESTLING

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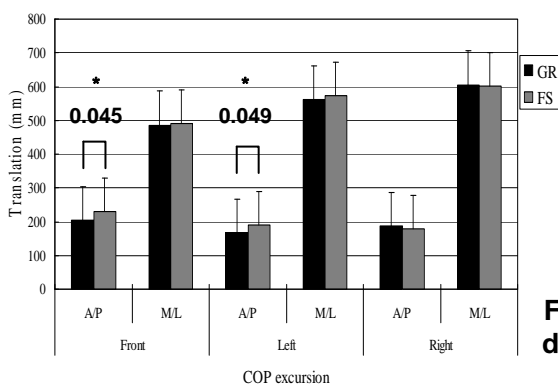
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**KEY WORDS:** wrestling, injury mechanism, joint kinematics, centre of pressure

**INTRODUCTION:** Wrestling is one of the oldest and most popular competitive sports in the world. However, knowledge of the biomechanics of wrestling is not well established and the biomechanical risk factors of injuries remain unclear (Boden et al., 2002). The purpose of this study was to investigate the joint kinematics of the lower limbs and the center of pressure (COP) movements in Greco-Roman style (GR) and free style (FS) wrestlers during tackle defense.

**METHODS:** 18 male college wrestlers participated in this study: 10 majored in GR (height: 171.1±8.0 cm; weight: 73.9±11.5 kg) and 8 in FS (height: 169.0±5.2 cm; weight: 71.8±11.4 kg). The wrestlers received tackle attacks from the front (FD), left (LD) and right (RD) while their kinematic data measured by a 7-camera motion capture system (Vicon 512) at a sampling rate of 120Hz and ground reaction forces from two AMTI forceplates at a sampling rate of 1080Hz. Independent t-test was used for comparisons of the calculated variables between the GR and FS groups for each condition.

**RESULTS and DISCUSSION:** Compared to the GR group, the FS wrestlers tended to have greater anterior/posterior (A/P) excursions of the COP during FD and LD with greater knee flexion (Fig. 1 & Table 1). This flexed knee strategy may be related to the rule of the game and the training the FS wrestlers received. The FS group was also found to defend tackles with greater knee rotation. Increased joint angles in the transverse plane at the knee and ankle found in this study may subject the joints to a higher risk of ligament injuries commonly found in wrestlers, especially when resisting external force during practices or competitions.



**Table 1 Averaged peaks of knee and ankle joint angles**

Degrees	FD		LD		RD	
	GR	FS	GR	FS	GR	FS
Knee flexion	70.40	94.53	61.49	88.31	78.62	88.09
Knee IR	0.63	11.33	3.70	2.68	8.61	4.05
Ankle IR	4.40	11.06	6.78	4.40	5.27	6.71

**Fig. 1: A/P and medial/lateral (M/L) excursions of COP during FD, LD and RD in GR and FS group. \*: p<0.05.**

**CONCLUSION:** Differences between GR and FS wrestling were found in the resisting duration, joint angles and COP movements in the current study. The defending strategies adopted in the two styles of wrestling were quite different when facing a tackle attack. The current results support the high injury risk of the lower extremities among wrestlers. Strengthening of the muscles of the lower extremities is suggested for the improvement of the functional performance and prevention of lower extremities injuries.

## REFERENCES:

Boden BP, Lin W, Young M, Mueller FO (2002) Catastrophic injuries in wrestlers. *American Journal of Sports Medicine*. 30, 791-795.