POSTURAL CONTROL IN ELITE ARCHERS DURING SHOOTING

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INTRODUCTION: Archery is described as a static sport requiring fine movement control and proper endurance strength of the upper body (Soylu, Ertan, & Korkusuz, 2006).To investigate the differences of postural control (PC) between elite and general collegiate archers during static and shooting conditions.

METHODS: Nineteen archers were recruited as elite archers (EA, nine archers, FITA scores: 1210.1 ± 19.1 points, age: 20.2 ± 1.6 years, height: 170.0 ± 6.1 cm, mass = 81.2 ± 25.6 kg) and general archers (GA, ten archers, FITA scores: 1122.5 ± 47.3 points, age: 20.1 ± 1.0 years, height: 173.3 ± 9.6 cm, mass: 70.1 ± 14.9 kg) according to the scores of single round, International Archery Federation (FITA). PC was measured with a portable three-axis force plate which sample rate was set at 100 Hz as mean radius, velocity, and the sway area of the center of foot pressure (COP) during different testing conditions (Lee & Lin, 2008). The static testing posture included single/double limb(s) standing with open/closed eyes. The shooting testing posture included two times 6 arrows archery shooting for 50 meters. An independent *t*-test analysis was used to examine the differences between two groups in each PC parameters during the static and the shooting condition. The statistic significance was set at $p < .05$.

RESULTS: No significant differences were found in static testing condition between groups. However, EA showed significant smaller COP sway velocity and area in shooting condition than GA (3.53 ± 0.75 vs. 4.42 ± 0.93 mm/s, $t = -2.31$; 2.98 ± 1.43 vs. 6.50 ± 4.16 mm^2, $t = -2.41$). Furthermore, the COP sway area was also significant smaller during the better, high-scores shooting arrows than poor, lower shooting scores arrows (4.49 ± 3.70 vs. 5.30 ± 4.29 mm/s, $t = -2.48$).

DISCUSSION: Significant better PC during archery shooting in EA implied that physical training enhances bipedal equilibrium control and reduces body oscillations during static and dynamic equilibrium tests. In addition, elite gymnasts highlight good stability when completing a unipedal dynamic equilibrium task due to their physical training which develops equilibrium specifically.

CONCLUSION: Elite collegiate archers showed better PC during shooting conditions and high-scores shooting arrows than GA which demonstrated the close relationship between high archery performance and good postural control ability.

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