THE KINEMATICAL ANALYSIS OF 110M HURDLES

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KEY WORDS: 110m hurdles, body height, the angular velocity of the driving leg.

INTRODUCTION: The purpose of this study was to kinematically analyse 110m hurdlers' motion, with reference to body height.

METHODS: Twenty male hurdlers, including elite level, participated in this study. The interval running and hurdling motions were recorded with a digital VTR camera (60 Hz) and two high-speed VTR cameras (250 or 200 Hz) in the official competitions. The following kinematic parameters were primarily analysed: 1) running velocity, which was defined as the average of CG horizontal velocities from 6th hurdle to 7th; 2) angles and angular velocities of the lower limb segments and joints; 3) landing distance, which was defined as the distance from the hurdle to the toe at the contact with the ground; 4) angular velocity of the driving leg, which was defined as the angular velocity of a vector pointing from the hip to the ankle.

RESULTS: Figure 1 shows correlation between the landing distance and body height (r = -.503, p < .05). Figure 2 shows correlation between the angular velocity of the driving leg at the touchdown of the hurdling (1st step) and running velocity (r = -.616, p < .01). Similarly, the angular velocities of the driving leg at the foot contacts of the 2nd and the 4th steps correlated with running velocity.

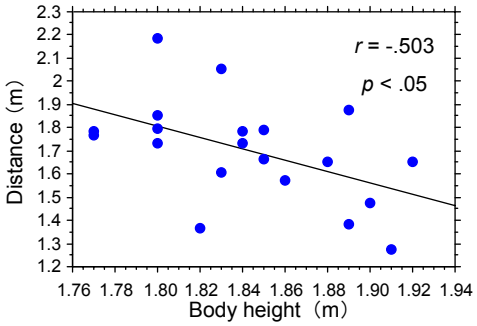

Figure 1. Correlation between the landing distance and body height.

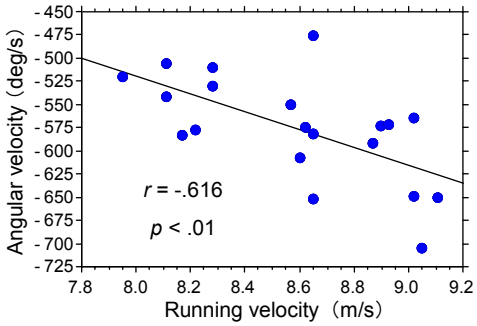

Figure 2. Correlation between the angular velocity of the driving leg at the touchdown of the hurdling and running velocity.

DISCUSSION: McDonald (2002) reported that the rapid pull down of the lead leg was effective in breaking the fall of the center of mass (CM) after hurdle clearance, which could keep the faster forward velocity at the 2nd step. Therefore, for the taller hurdlers, it can be thought that shorter landing distance was effective for breaking of the fall of the CM. Regardless of the body height, however, the faster hurdlers displayed the large angular velocity of the driving leg at the touchdown of the hurdling, which might have caused the larger CG velocity in the support phase. Regarding the absence of significant correlation between the angular velocity of the driving leg at the 3rd step and running velocity, it may be thought that the body height, especially the leg length, may have influenced the angular velocity of the driving leg, or that hurdlers performed other motions at the 3rd step despite the body height and running velocity.

REFERENCES:

McDonald, C. (2002). Hurdling is not sprinting. *Track Coach 161,* 5137-5143.