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Kinematic profile of elite high jumpers – what distinguishes good from great high jumpers?

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INTRODUCTION:
It has been shown that the success in high jump very often relies on the ability of a jumper to manipulate biomechanical factors that are closely related with optimization of the. Effectiveness in high jumping largely depends on the take-off (TO) action, contact time with the ground, ankle, and knee angles at touch-down (TD) and TO, height of the center of mass (CoM) at TO. We hypothesized that the highest successful attempt will be correlated with kinematic parameters related to peak CoM and peak pelvis position.
METHODS:
Data were obtained from the report of Nicholson et al. (2019), on 12 female (body height 182.3±6.9 cm; body weight 63.4±6.8 kg) and 11 male (body height 192.5±2.3 cm; body weight 75.9±6.67 kg) finalist of the IAAF World Championship, that was held in March 2017 in Birmingham, UK. Following variables were analysed and presented: body height; body weight; H1: the height of the centre of mas (CoM) at the instant of touchdown (TD) during the final contact; H2: the height of the CoM at the instant of toe-off (TO) during the take-off phase; H3: peak CoM location; peak pelvis height; knee angle at TD/TO; ankle angle at TD/TO; time spent in knee flexion; time spent in knee extension; TO contact time. Correlations between the highest successful attempt and kinematical parameters, for both women and men, were obtained by calculating Pearson's correlation, by using Jamovi.
RESULTS:
In women, significant correlations were found among highest successful jump and peak CoM location (r=0.61, p=0.033) and peak pelvis height (r=0.85, p=0.001). On the other hand, in men, significant correlations were obtained among highest successful attempt and the height of the CoM at the instant TO (r=0.60, p=0.05); peak CoM location (r=0.85, p=0.001); peak pelvis height (r=0.83, p=0.001); and ankle angle at TD (r=0.67, p=0.024).
CONCLUSION:
Similar to Čoh & Supej (2008), our study has shown that success in high jump often depends on CoM and pelvis position as well as ankle angle at TD. All jumpers in this study achieved excellent results despite very large variability in kinematic parameters, proving that coordination, strength, and speed patterns are different, but they have not been a disadvantage. From the coaching perspective, training program must be tailormade individually, considering one's physical attributes, strength, and speed qualities as well as individual technical aspects.

Topic: **Coaching**

Presentation **Oral**