

The Three-Dimensional Kinematics of the Sprint Start in Young Elite Sprinters

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Abstract : The purpose of this study was to identify the three-dimensional kinematics of the sprint start during the start phase of the sprint. The purpose of this study was to identify the three-dimensional kinematics of the sprint start during the start phase of the sprint. Moreover, the effect of anthropometrical factors such as skeletal muscle mass, thigh girth, and calf girth also were considered on the kinematics of the sprint start. Among all young sprinters involved in the national Belgium league, sixty sprinters (boys: 14.7 ± 1.8 years and girls: 14.8 ± 1.5 years) were randomly selected. The kinematics data of the sprint start were collected with a Vicon® 620 motion analysis system equipped with 12 infrared cameras running at 250 Hz and running the Vicon Data Station software. For statistical analysis, T-tests and ANOVA's with Scheffé post hoc test were used and the significant level was set as $p \leq 0.05$. The results showed that the angular positions of the lower joints of the young sprinters in the set position were comparable with adult figures from literature, however, with a greater range of joint extension. The most significant difference between boys and girls was found in the set position, where the boys presented a more dorsiflexed ankle. No further gender effect was observed during the leaving the blocks and contact phase. The sprinters with a higher age, skeletal muscle mass, thigh girth, and calf girth displayed a better angular position of the lower joints (e.g. ankle, knee, hip) in the set position, a more optimal angular position for the foot and knee for absorbing impact forces at foot contact and finally a higher range of flexion/extension motion to produce force and power when leaving the blocks.

Keywords : anthropometry, kinematics, sprint start, young elite sprinters

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