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Biomechanical analysis of the final strides of the approach and the take-off by visually impaired class F12 and F13 long jumpers

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Abstract

Despite of the level of visual acuity, European Records in long jumping are greater in class F12 (visual acuity 2/60) than class F13 (visual acuity 6/60) both in males and females. The aim of the present study was to compare the biomechanical parameters of the final strides of the approach and the take-off in class F12 and F13 long jumpers. 19 class F12 (males: 13, females: 6) and 12

class F13 (males: 4, females: 8) long jumpers participating in the 2009 International Blind Sports Association European Championships were recorded using a stationary digital video camera (sampling frequency: 300 fps). Key biomechanical parameters were extracted with a typical 2D-DLT kinematical analysis. Differences between groups were investigated using Independent samples t-test. Results indicated that the official distance was $6.07 \text{ m} \pm 0.55$ and $5.52 \text{ m} \pm 0.91$ for F12 and F13 respectively ($p < .05$). Significant differences were also observed concerning the vertical take-off velocity (F12: 2.8 m/sec , F13: 2.4 m/sec), the support leg's knee flexion (F12: 18.2 deg , F13: 25.2 deg) and the knee joint flexion velocity (F12: 7.4 rad/sec , F13: 10.2 rad/sec) at the take-off board and the knee maximum flexion angle at the last stride (F12: 116.8 deg , F13: 125.4 deg). In conclusion, F12 performed better than F13 because of the more

advantageous utilization of the factors defining the vertical component in the long- jump take-off. Additionally, the different last stride maximum knee flexion angle might imply differences concerning the mechanics of the placement of the take-off leg. It is possible that factors such as the size and surface properties of the 1.22 m x 1.00 m chalked take-off area used in F12 competition may contribute to the differences observed in the study.

Key words: 2D-DLT ANALYSIS, STRIDE LENGTH, JOINT ANGULAR KINEMATICS, VISUAL ACUITY, TECHNIQUE

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