DESIGNING A 2D BIOMECHANICAL MODEL TO MEASURE THE GROUND REACTION FORCE OF LONG JUMPERS

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The purpose of this study was to measure the ground reaction force in the take-off phase of long jumpers. Available facility: expensive force plates, does not provide kinematics of body segments of long jumpers. A 2D biomechanical model was designed with necessary kinematics of body segments of long jumpers to observe maximum ground reaction force. Sri Lankan National level long jumpers (8) were performed their performance between 7.50 m and 8.20 m distance. Two cameras (100 Hz) were used (on the sagittal plane) to observe their coordinates of all body segments in the take-off phase. The kinematics of all body segments: calf, thigh, torso, upper arm, forearm, head and neck were calculated using human movement analysing software (Kinovea). Anthropometric measurements of long jumpers calculated considering the characteristics of model of 14 segments. Standard Lagrange dynamic equation used to derive ten dynamic equations (biomechanical model) of body segments of long jumpers. Using 2D biomechanical model, the maximum ground reaction force (2614 N) of a long jumper (72.1 kg, 174 cm) was calculated. The maximum ground reaction force (take-off) of long jumpers varied in the range of 2500 N to 4100 N.The ground reaction force in the take-off phase can be predicted for any long jumpers corresponding to the kinematics of body segments of long jumpers through the 2D biomechanical model.

Keywords: *Long jump, Take-off phase, Ground reaction force, Biomechanical model*