

The Energy Expenditure for a Sit-Up with Respect to the Body Mass and Height

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Sit-up tests have been involved to measure the abdominal strength and endurance of players in training sessions and specific skill tests independent from body weight and height. The weight and height of the body interact with the energy expenditure. This study was aimed at evaluating the energy expenditure of Sit-Ups of players corresponding to the body segment parameters: height and weight. The biomechanical model of the dynamic movement of Sit-Up was designed considering the involvement of the active muscles: rectus femoris, psoas major and iliacus. The performances of 30s Sit-Up test of players were captured using a high-speed camera (100 Hz). The biomechanical model described the main active muscles' forces (Rectus Femoris: 0-900 N, Psoas 0-300 N, and Iliacus 0-295 N) and total mechanical energy expenditure (132.66 J: 70.72 J, 61.94 J concentric and eccentric movements, respectively; player: mass 67.5 kg and height 1.66 m) for any player. The biomechanical model demonstrates the energy expenditure for anyone ($E_{Avg} = 0.317 + 0.002 \text{ cal}$).

Keywords: Biomechanical Model, Body Height, Hip Flexors, Mass