

ORIGINAL RESEARCH

EMG ANALYSIS AND SAGITTAL PLANE KINEMATICS OF THE TWO-HANDED AND SINGLE-HANDED KETTLEBELL SWING: A DESCRIPTIVE STUDY

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ABSTRACT

Introduction: Kettlebell (KB) swing exercises have been proposed as a possible method to improve hip and spinal motor control as well as improve power, strength, and endurance.

Purpose: To describe electromyographic (EMG) and sagittal plane kinematics during two KB exercises: the two-handed KB swing (THKS) and the single-handed KB swing (SHKS). In addition, the authors sought to investigate whether or not hip flexor length related to the muscular activity or the kinematics of the exercise.

Methods: Twenty-three healthy college age subjects participated in this study. Demographic information and passive hip flexor length were recorded for each subject. A maximum voluntary isometric contraction (MVIC) of bilateral gluteus maximus (GMAX), gluteus medius (GMED), and biceps femoris (BF) muscles was recorded. EMG activity and sagittal plane video was recorded during both the THKS and SHKS in a randomized order. Normalized muscular activation of the three studied muscles was calculated from EMG data.

Results: During both SHKS and THKS, the average percent of peak MVIC for GMAX was 75.02% \pm 55.38, GMED 55.47% \pm 26.33, and BF 78.95% \pm 53.29. Comparisons of the mean time to peak activation (TTP) for each muscle showed that the biceps femoris was the first muscle to activate during the swings. Statistically significant ($p < .05$), moderately positive correlations ($r = .483$ and $.417$) were found between passive hip flexor length and % MVIC for the GMax during the SHKS and THKS, respectively.

Conclusions: The THKS and SHKS provide sufficient muscular recruitment for strengthening of all of the muscles explored. This is the first study to show significant correlations between passive hip flexor length and muscular activation of hip extensors, particularly the GMax. Finally, the BF consistently reached peak activity before the GMax and GMed during the SHKS.

Key Words: Electromyography, hip flexor, hip extension, kettlebell

Level of Evidence: Level 3

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