Understanding the Effect of Body Weight on Muscle Activity During Unilateral Hopping
Journal of Health Disparities Research and Practice

Volume 9
Issue 5 *Special Issue - NIDDK STEP UP*

Article 68

2016

Understanding the Effect of Body Weight on Muscle Activity During Unilateral Hopping

Christian Lopez
Michael Soucy, BS , *University of Nevada Las Vegas*
John Mercer, PhD , *University of Nevada Las Vegas*

See next page for additional authors

Understanding the Effect of Body Weight on Muscle Activity During Unilateral Hopping

Abstract

Running can be described as a series of bilateral single-legged jumps and landings. Interestingly, single-legged jumps and landings are qualitatively more difficult unilaterally than bilaterally known as bilateral deficit syndrome (BDS). For example, one leg will produce less mechanical energy while jump squatting unilaterally than it would produce if both legs worked synchronously. The analysis of dynamic conditions under different levels of body weight support of the hopping movement may prove useful to understanding the bilateral deficit. Purpose: To compare muscle activity of the lower extremity during single-legged hopping at different levels of body weight support.

Methods: The research study was recently approved by the Institutional Review Board and data collection has begun. Therefore, no data are presented in the abstract at this time. Subjects will be equipped with electromyography (EMG) leads to measure muscle activity of the rectus femoris, semitendinosus, medial gastrocnemius, and tibialis anterior. Subjects will be asked to perform 5 trials of hopping forwards at a preferred speed (PS) for 1 minute at varying levels of body weight (80%, 70%, 60%, 50%, 40%). EMG data of all four muscles will be compared across the separate body weight control conditions.

Keywords

Unilaterally/Bilaterally; Body Weight Support; Electromyography

Authors

Christian Lopez; Michael Soucy, BS; John Mercer, PhD; and Taylor Lau

Journal of Health Disparities Research and Practice
Volume 9, Special Edition 1, Summer 2016, pp. 100-101

School of Community Health Sciences
University of Nevada, Las Vegas

Understanding the Effect of Body Weight on Muscle Activity During Unilateral Hopping

Christian Lopez
Michael Soucy, University of Nevada Las Vegas
John Mercer, PhD, University of Nevada Las Vegas
Taylor Lau, University of Nevada Las Vegas
Coordinating Center: Stanford University

ABSTRACT

Running can be described as a series of bilateral single-legged jumps and landings. Interestingly, single-legged jumps and landings are qualitatively more difficult unilaterally than bilaterally known as bilateral deficit syndrome (BDS). For example, one leg will produce less mechanical energy while jump squatting unilaterally than it would produce if both legs worked synchronously. The analysis of dynamic conditions under different levels of body weight support of the hopping movement may prove useful to understanding the bilateral deficit.
Purpose: To compare muscle activity of the lower extremity during single-legged hopping at different levels of body weight support.
Methods: The research study was recently approved by the Institutional Review Board and data collection has begun. Therefore, no data are presented in the abstract at this time. Subjects will be equipped with electromyography (EMG) leads to measure muscle activity of the rectus femoris, semitendinosus, medial gastrocnemius, and tibialis anterior. Subjects will be asked to perform 5 trials of hopping forwards at a preferred speed (PS) for 1 minute at varying levels of body weight (80%, 70%, 60%, 50%, 40%). EMG data of all four muscles will be compared across the separate body weight control conditions.

Key Words: Unilaterally/Bilaterally: using one (uni) or two (bi) extremities (in this case the lower extremity) in an activity.
Body Weight Support: The percent of body weight that the subject is hopping at (E.G. subject that weighs 100 lbs. will weigh 80 lbs. at 80% body weight support)
Electromyography: method of analyzing neural electrical activity involved in the movement of muscles.

ACKNOWLEDGEMENTS

The STEP-UP HS program is supported by the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health, Grant number: R25DK078382.