



Original Article

Correlation between toe flexor strength and ankle dorsiflexion ROM during the countermovement jump

Sung Joon Yun, PT, MSc^{1, 2)}, Moon-Hwan Kim, PT, PhD²⁾, Jong-Hyuck Weon, PT, PhD³⁾, Young Kim, PT, PhD⁴⁾, Sung-Hoon Jung, PT, BHSc⁵⁾, Oh-Yun Kwon, PT, PhD⁵⁾*

¹⁾ Department of Rehabilitation Therapy, Graduate School, Yonsei University, Republic of Korea

²⁾ Department of Rehabilitation Medicine, Wonju Severance Christian Hospital, Yonsei University, Republic of Korea

³⁾ Department of Physical Therapy, Joongbu University, Republic of Korea

⁴⁾ Department of Rehabilitation Therapy, Institute of Health Science, Yonsei University, Republic of Korea

⁵⁾ Department of Physical Therapy, College of Health Science, Laboratory of Kinetic Ergocise Based on Movement Analysis, Yonsei University: 1 Yonseidae-gil, Wonju, Gangwon-do 26493, Republic of Korea

Abstract. [Purpose] This study assessed the relationships between peak toe flexor muscle strength, ankle dorsiflexion range of motion, and countermovement jump height. [Subjects and Methods] Eighteen healthy volunteers participated in the study. Each participant completed tests for peak toe flexor muscle strength, ankle dorsiflexion range of motion, and countermovement jump height. [Results] The results showed (1) a moderate correlation between ankle dorsiflexion range of motion and countermovement jump height and (2) a high correlation between peak first toe flexor muscle strength and countermovement jump height. Peak first toe flexor muscle strength and ankle dorsiflexion range of motion are the main contributors to countermovement jump performance. [Conclusion] These findings indicate that the measurement of peak first toe flexor muscle strength and ankle dorsiflexion range of motion may be useful in clinical practice for improving jump performance in athletes training for sports such as volleyball and basketball.

Key words: Ankle dorsiflexion, Countermovement jump, Toe strength

(This article was submitted Feb. 18, 2016, and was accepted May 7, 2016)

INTRODUCTION

The countermovement jump (CMJ) is an explosive movement that is essential in many sports, including basketball and volleyball¹⁾. CMJ height, which is determined by measuring the jump height starting from an erect position followed by a downward movement before starting to push off, is an important criterion in athletic evaluation. Athletes spend much time and effort in various training activities to improve their athletic performance²⁾. Many researchers have reported the performance characteristics of the CMJ and have discussed multiple issues related to achieving better CMJ height^{3–5)}.

Ugrinowitsch et al.⁶⁾ reported that better CMJ height was the result of an increased vertical shift in the body's center of mass. To improve CMJ performance, ankle flexibility⁴⁾, muscle strength^{3, 7, 8)}, initial jumping posture (squat depth)⁵⁾, and take-off velocity during vertical jump¹⁾ are required. Robertson and Fleming⁹⁾ investigated the contributions of the extensors in the lower limb and found that the greatest contributor to jump performance was the hip (40%) followed by the ankle

*Corresponding author. Oh-Yun Kwon (E-mail: kwonoy@yonsei.ac.kr)

©2016 The Society of Physical Therapy Science. Published by IPEC Inc.

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivatives (by-nc-nd) License <<http://creativecommons.org/licenses/by-nc-nd/4.0/>>.