Comparative Study of Isokinetic Dynamometry and the Standing Heel-Raise Test for Assessing Ankle Plantar Flexion Strength

Introduction:
The purpose of this study was to improve physical therapy evaluation techniques for addressing ankle strength. The study compared three methods of testing ankle plantar flexion strength: 1) Biodex System 3 Isokinetic Dynamometer, 2) Dr. Perry Standing Heel-Raise Test (SHRT), and 3) Plantar flexion torque production on a force plate during the standing heel-raise test.

Methods:
The subject's dominant limb was tested on the Biodex System 3 to gather data on their plantar flexion peak torque per body weight output. The subject then performed the Dr. Perry Standing Heel-Raise Test during motion capture on a force plate. The maximum number of heel raises the subject could perform and the plantar flexion torque during the heel-raise test were both measured.

Subjects
- Study group size: 28
- Under 35 years of age: 14
- 35 years of age and older: 14
- Males: 11
- Females: 17

Analysis:
Statistical analysis was performed to compare the results of the Biodex plantar flexion strength test, the Dr. Perry Standing Heel-Raise Test, and the plantar flexion force plate torque values measured during the heel-raise test. Tests and ANOVAs were performed on multiple variables such as peak torque to body weight, age, and sex.

Conclusion:
- Men demonstrated significantly higher Biodex peak torque values and performed more heel raises than women (p < .05).
- Subjects younger than 35 years of age produced higher Biodex peak torque values than subjects older than 35 years (p < .05).
- A significant correlation was found between the number of heel raises performed and the Biodex peak torque per body weight (p < .03).
- There was a significant correlation between the number of heel raises performed and the Biodex power values (p < .01).

When compared to more sensitive measures of strength, such as isokinetic dynamometry, manual muscle testing has been shown to be insensitive in detecting mild weakness of the plantar flexors. This study collected normative isokinetic dynamometry data for plantar flexor strength and looked for correlations among the Standing Heel-Raise Test (SHRT), isokinetic dynamometry strength tests, and torque production on a force plate during the heel-raise test.