

"GLUTEUS MINIMUS AND GLUTEUS MEDIUS MUSCLE ACTIVITY DURING COMMON REHABILITATION EXERCISES IN HEALTHY POSTMENOPAUSAL WOMEN"

Ganderton, C., Pizzari, T., Cook, J., & Semciw, A. Gluteus Minimus and Gluteus Medius Muscle Activity During Common Rehabilitation Exercises in Healthy Postmenopausal Women. J Orthop Sports Phys Ther, 2017;47;12:914-922

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RESEARCH QUESTION

What are the muscle activation levels of the anterior and posterior fibers of gluteus minimus (GMin) and anterior, middle and posterior fibers of gluteus medius (GMed) during isometric and dynamic exercises?

WHAT DO WE KNOW ALREADY?

Gluteus minimus and medius are prone to atrophy, fatty infiltration, and weakness in the advanced aging population. Dysfunction of GMin and GMed are associated with the following conditions: hip osteoarthritis, lateral hip pain, femoroacetabular instability, difficulty walking, stair climbing, transitioning from sit to stand and single limb weight-bearing tasks.

Declining estrogen in women magnifies the prevalence of structural changes in tendons, bone density, and declining muscle strength, increasing their susceptibility to hip pathology.

Understanding the effectiveness of targeted exercise commonly used in rehabilitation would be beneficial to structuring treatment protocols.

RESEARCH METHODS

Subjects: Ten healthy postmenopausal older women with various activity levels and BMI 25.3 ± 3.5 .

"Postmenopausal" was defined as greater than 12 months amenorrhea. Participants had no history of hip, back or limb dysfunction.

Fine wire intramuscular electrodes were inserted into GMin anterior and posterior fibers and GMed anterior, middle and posterior fibers under real-time ultrasound.

EMG data was collected during 4 isometric exercises (hip hitch/hike, hip hitch with toe tap, hip hitch with hip swing, standing isometric abduction with belt) and 3 dynamic exercises (sit-to-stand, dip test/lung, and clam).

Friedman test was performed to detect differences in muscle activity across exercises.

Friedman test = non-parametric alternative to the one-way ANOVA with repeated measures; used to test for differences between groups when the dependent variable being measured is ordinal.

WHAT'D THEY FIND?

Neuromuscular Output / Activation strength

Order denotes highest to lowest activation levels

Hip hitch with swing (isometric)

*Mimics mid-stance phase of gait

- GMed: anterior/middle/posterior fibers
- GMin: posterior fibers

Hip hitch (isometric)

*Mimics stance at initiation of gait.

- GMin: anterior fibers

Hip hitch with toe tape (isometric)

* Mimic approaching terminal stance phase

- 3rd in level of activation for all fibers

Dip test

- 4th in level of activation

Lowest level of activation for all fibers

Isometric Abduction with belt

Sit-to-stand

Clam

TAKE HOME

The greatest activation for gluteus medius anterior fibers and gluteus minimus posterior fibers occurs during isometric exercises in the weight-bearing position, hip hitch and variations.

Clams had the least activation of gluteus minimus and medius of all exercise. GMed and GMin are primarily hip stabilizing muscles in the closed-chain position and control the pelvis during locomotion.

The findings support that understanding fiber orientation and activation properties can assist in developing exercise that may be able to bias muscles within a group.

LIMITATIONS?

The study only included healthy older women; therefore, findings may be limited in generalization, considering that this population may have a dysfunctional recruitment pattern.