

EXAMINATION OF GLUTEUS MAXIMUS ELECTROMYOGRAPHIC EXCITATION ASSOCIATED WITH DYNAMIC HIP EXTENSION DURING BODY WEIGHT EXERCISE: A SYSTEMATIC REVIEW

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ABSTRACT

Background: Hip extension is an important action in daily activities (standing, stepping and walking) and sporting actions (running, sprint-running and jumping). Though several different exercises exist, a comprehensive understanding of which exercises best target the gluteus maximus (Gmax) and the magnitude of muscular excitation associated with each exercise is yet to be established.

Purpose: The purpose of this systematic review was to describe the electromyographic (EMG) excitation of the Gmax during body weight exercises that utilize hip extension.

Methods: A systematic approach was used to search Pubmed, Sports Discuss, Web of Science and Science Direct using the Boolean phrases (gluteal OR gluteus maximus) AND (activity OR excitation OR activation) AND (electromyography OR EMG) AND (hip extension). Articles that examined injury-free participants of any age, gender or excitation level were included. Articles were excluded when not available in English, where studies did not normalize EMG excitation to maximum voluntary isometric contraction (MVIC), where a load or resistance was added to the exercise, or where no hip extension occurred. Exercises were grouped into vertical and horizontal (anteroposterior or posteroanterior) force vectors.

Results: Thirty-nine studies of high methodological quality were retained for analysis. Twenty-five exercises were performed in the vertical vector (average: 33.4% MVIC, highest: single leg wall squat 86% MVIC), fourteen exercises were performed in the horizontal (anteroposterior) force vector (average: 32.8% MVIC, highest: single leg bridge 54.2% MVIC, while thirty-eight exercises were included in the horizontal (posteroanterior) vector (average: 30.4% MVIC, highest: plank with bent leg hip extension 106.2% MVIC).

Limitations: The differences in subject's backgrounds, exercise technique and the methodological approaches varied between studies, most notably in the different positions used for obtaining MVIC, which could have dramatically impacted normalized levels of gluteal activation.

Conclusion: The findings from this review provide an indication of Gmax muscle excitation generated by a variety of hip extension body weight exercises, which may assist practitioners in making exercise selection decisions for programming.

Keywords: gluteal musculature, hip strengthening, force vector, EMG, movement system

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