

ABSTRACT-ESEF- 2015

HAMSTRING MUSCLE ACTIVATION CAN BE AFFECT BY THE KNEE JOINT POSITION DURING THE STIFF EXERCISE

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Introduction: The Stiff is a common resistance exercise that emphasizes both gluteus maximus and hamstrings muscles (biceps femoris, semitendinosus, semimembranosus). Considering the complex biarticular function of hamstrings muscles, as hip extensors and knee flexors, any change in the joint position or the length-tension relationship may affect the muscle activation pattern.

Methods: Five young resistance-trained men volunteered to participate in this study (25±4years, 174±8cm, 71±6kg). After a brief familiarization and warm-up, all subjects performed the Stiff exercise in two different knees joint positions: knee joint fully extended (KE), and knee joint in flexion at 20 degrees (KF). For both conditions the range of movement and the cadence (40bpm) were controlled, and randomized as well. Subjects realized 10 repetitions using a barbell, and an external load of 20% of the total body mass for each condition (EXT and KF). A 5-min of resting was adopted between conditions. The superficial electromyographic signal (sEMG) from the biceps femoris long head (BF), and Gluteus Maximus (GM) were measured in both conditions (KE and KF) at 2 kHz of sampling rate. The sEMG data was filtered, normalized by the maximum isometric voluntary contraction (MIVC), and then it was integrated (IEMG) for each repetition. A repeated-measure ANOVA (2x2) was used to compare the IEMG differences. The significance was set at 5%.

Results: There was observed significant difference between KE and KF only to BF muscle ($p=0.015$; $d=1.31$; $\Delta\%=51\%$). The GM IEMG did not present significant difference between conditions.

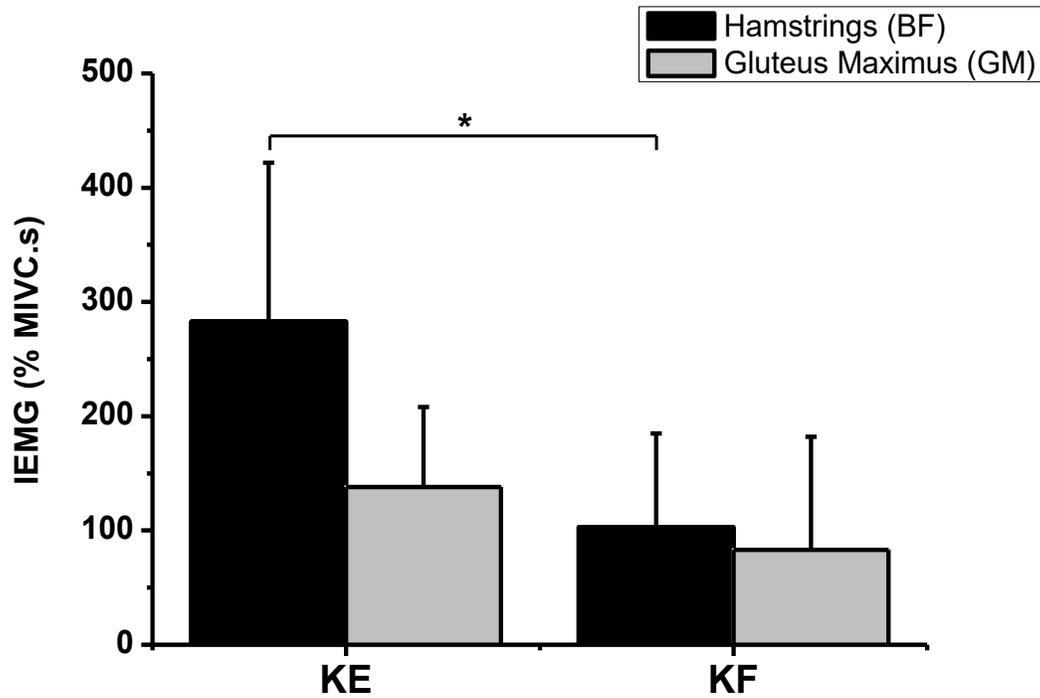


Figure 1. Mean \pm standard deviation of the IEMG for different conditions (KE and KF) and muscles (BF and GM) during the Stiff exercise.*Significant difference, $p < 0.05$.

Conclusion: The knee joint position can change the hamstring muscle action. The BF was more activated during the Stiff exercise with the knee joint extended, however the GM muscle activation was not influenced by the knee joint position.