TACSM Abstract

The Effects of Two Post-Activation Potentiation Methods on Muscular Activation

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ABSTRACT

Post Activation Potentiation (PAP) is an exercise concept based on utilizing a maximal voluntary contraction of the muscles at task to potentiate a dynamic muscular contraction of the same muscles. It is well established that PAP is modulated between performance readiness and muscular fatigue. Heart Rate percentage (HR%) has been used as an indicator of performance readiness and muscular fatigue. **PURPOSE**: To examine different muscular activation (μV) in response to two different PAP protocols during the vertical jump exercise. **METHODS**: 8 participants (5 males and 3 females; mean ± *SD*: Age = 22.6 ± 1.76 years; Height = 1.70 ± .07 m; Weight = 76.58 ± 15.30; BMI = 26.22 ± 3.49) participated in this block randomized cross over design study. After obtaining baseline measures (Maximal Voluntary Contraction [MVC] for each muscle and 1 repetition maximum [1RM] of the back squat), subjects were randomly assigned into one of two test conditions: 1) PAP with Time in between exercises (PAP-T test) and 2) PAP using 50% of Maximal Heart Rate (MHR) between exercises (PAP-HR%). Both tests consisted of 5 repetitions of back squats at 87% of 1RM followed by a rest period and then a vertical jump. During the PAP-T test, the rest period consisted of 1-minute rest in between the squats and the vertical jump, whereas during the PAP-HR% subjects rested until 50% of the MHR (220-age = MHR) was achieved. ElectroMyoGraphical (EMG) signals were recorded from the leg muscles Rectus Femoris (RF), Bicep Femoris (BF), and Gastrocnemius (GS). Vertical jump performance was assessed using a validated video app (MyJump2 app). Non-parametric Friedman-test for repeated measures was used to assess differences in muscular activation and vertical jump height for all conditions. A post hoc test was conducted to find pairwise differences when appropriate, at a significance level of alpha 0.05. **RESULTS:** The Friedman-test revealed a difference in muscular activity (μV) between both PAP conditions and baseline in the RF ($p = 0.02$), BF ($p = 0.00$), and GS ($p = <0.0001$). The post hoc test revealed no differences between PAP-T and PAP-HR% protocols on the RF, BF, or GS ($p > 0.05$). Further analysis indicated that only the PAP-HR% was different from baseline on the RF ($p = 0.01$), BF ($p = 0.01$), and GS ($p = 0.01$).Similarly, the PAP-T condition only showed to be different on the BF ($p = 0.00$) when compared to the baseline. Finally, there was no difference in vertical jump performance on either of the conditions ($p > 0.05$). **CONCLUSION**: In this study**,** PAP-HR% appeared to generate greater muscular activation in the RF, BF, and GS despite not being associated with producing a greater vertical jump height. The use of HR% as a modulator during PAP inter-rest periods may represent a valuable method to increase muscular activation of the leg.