The Acute Effects of a Potentiation Warm-up on Vertical jump performance in College aged males

Exercise Science
Faculty Sponsor: Dr. Tim McInnis

INTRODUCTION

Past research has shown that performing high intensity muscle contractions before an event can create short-term increases in the maximum force produced by the activated muscles, which is also known as post-activation potentiation (PAP) (Hodgson et al., 2005; Robbins, 2005). It has also been shown that the acute effects of PAP can be used to improve an athlete’s performance by including resistance exercises in the warm-up (Matthews et al, 2003; Smith et al, 2001). It has been shown that the PAP effect is greater in subjects that have greater absolute strength (Gourgoulis et al., 2003; Rixon et al., 2007). Another source of inconsistency is due to the load percentage used during the PAP warm-up. Improvements in jump performance have been previously reported after using loads of greater than ninety percent of the subjects one repetition max (Comyns et al. 2007; Gourgoulis et al., 2003), while other studies have reported improvements following squats with loads as low as forty kilograms (Clark et al., 2006) and even loads at ten percent body weight (Burkett et al., 2005). This study investigates the effects of potentiation at 50% of a 1RM and 30% of 1RM, and no weighted load. Therefore, the purpose of the present study was to investigate the acute effects of performing weighted back squats on subsequent performance during a series of vertical jumps in college-aged males.

METHODS

Six college-aged males, who work out a minimum of three times a week, volunteered to participate in the study, which was approved by the Institutional Review Board of LaGrange College. All subjects stated that they had performed some type of resistance training in the previous three months. The test subjects are split up into the three groups. The first group will complete 4 reps at 50% of their 1RM. The next group will complete 4 reps at 30% of their 1RM. Lastly, the control group will complete a standard warmup of five minutes on a stationary bike. Exactly two minutes after their given warm up was performed, the test subjects completed their first max effort vertical jump. The subject will then complete two more maximal effort jumps with a small break to reposition in between each one. Their jump height will be recorded by a
jump plate. The standard jumping procedure for all test subjects will be the same. They will all start in a standing position and on command; they will start their descent down so that the patellofemoral joint is at a 120-degree knee angle and explode back up to complete their max effort vertical jump. Their feet will be shoulder width apart, and they are not allowed to use their arms to complete the jump, so we will have the subjects place their hands on their hips while they complete each jump.

RESULTS

 Results from our tests showed multiple things. Just from the observational perspective, it showed that the subjects that performed the bike warmup actually performed worse on their post warmup jumps. Subjects that performed the potentiation warmup, in which they squatted thirty percent of their 1RM, showed an improvement on average of 2.5 centimeters. Subjects that squatted fifty percent of their 1RM also showed an improvement of 2.75 centimeters, which from the observational stand point shows that a potentiation warmup is effective. From the statistical
standpoint though, the bike protocol had a p-value of .422826, which shows that it had no statistical significance. The 30% potentiation group had a p-value of .015392, which showed that this set of data was statistically significant. The 50% potentiation group had a p-value of .010477, which also showed this group showed statistical significance.

**DISCUSSION**

Our results conclude that a PAP warm-up increases jump height when weight is added. Both groups at 30% and 50% of their 1RM increased their jump height after completing the warm-up. The group on the bike, which was the standard warm-up, ended up decreasing in their jump height. This is what helps us conclude that weighted back squats does in fact help with performance more than doing a standard/static warm-up. Since we used very few participants in this study, it could be hard to find statistical significance. For future reference, it would be better for the results to have a larger sample size. To help find statistical significance we ran a single factor ANOVA test, which is the analysis of variance and the difference between group means. With this test, it showed us that the p-value for our results was .007128, which showed that our results are statistical significance due to the fact it is less than .05. As for the future, it would be good to incorporate the participant’s environment into the study. This way we know what they were doing prior to test and see if we could get a greater increase in jump height.

With our P-value being less than .05, it shows using a Post Activation Potentiation warm up resulted in a higher increase in jump performance compared to using standard warm up that is not task orientated. We found that with the standard bike warm up there was either no increase or a slight decrease in performance in relation to jump height.
ACKNOWLEDGEMENTS

The authors would like to thank the LaGrange College students & athletes who participated in this study and make this research possible.

REFERENCES


