

The effect of Leg Anaerobic and Aerobic leg exercises on the growth of Elbow Flexors

Andrew B. Armor; Dr. Bryan Hamilton, PhD; Waynesburg University Department of Biology, Waynesburg PA

ABSTRACT

The research performed was based on studying the elevations of natural hormone levels in female subjects. According to previous research, hormone levels may elevate based on different type of exercises focused on certain muscle groups. By exercising the lower extremity, specifically the quadriceps, growth and an increase of electrical activity may be seen in the biceps muscle of the arm. The electrical activity of each subject's bicep muscle was measured using electromyography (EMG). The study was conducted as a between subject design that allowed the average growth of electrical activity in the biceps brachia to be compared from subject to subject. Subjects who exercise both leg muscles as well as arm muscles were hypothesized to have a greater physical and electrical growth in the arms than the subjects whom only exercise arms. With six human subjects, those who performed both leg and arm exercises saw a larger increase in the electrical activity of their biceps at the end of the study. Those who only focused on bicep exercises through the study saw minimal, if any change in their EMG. These findings could benefit the fitness community by allowing trainers and trainees to redevelop their workout plans to involve more larger muscle groups in their training, rather than site-specific small muscle training. By doing this, more electrical energy is present in the body, which is related to hormonal increases and muscle growth.

METHODS

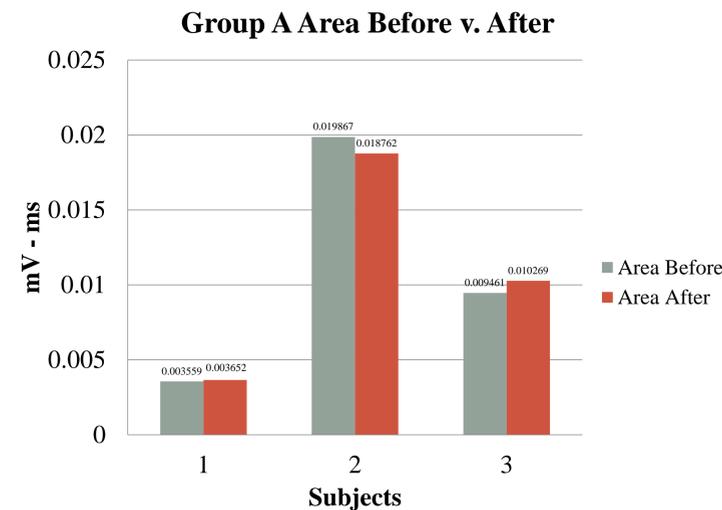
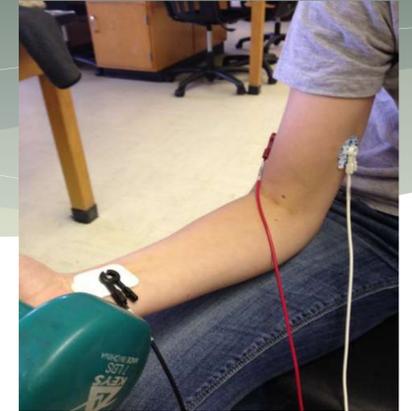
A between subject design was used to form the study to be able to compare the average growths of each subjects elbow flexors. A total of six female human subjects were used to determine outcomes. Participants in group A (3 females) trained their biceps brachia once a week for a total of two weeks without doing any other type of gym related weight training during the study. This group was tested in the beginning of the study using a one-rep max (ORM), 10-rep max and also by a surface EMG test of the bicep. These tests were then performed at the end of the study to compare results. Measurements of the biceps brachia were taken at the beginning and end of the study to see if there were any phenotypic adaptations to the arm (growth). Group A simply did three sets of bicep curls at 25% of their ORM once a week for two consecutive weeks. The subjects in group B (3 females) also performed the one rep max, surface EMG testing and bicep measurements. Week one for the Group B training regimen consisted of : Monday – squat, 3 sets of 10 at 20 pounds and an incline walk at 15 at 3.0 mph for 5 minutes , Wednesday – 3 sets of dumbbell curls at 25% of their ORM (3X10), Thursday – Squat, 3 sets of 10 at 30 pounds and an incline walk at 15 at 3.2 mph for 5 minutes. Week two of Group B's regimen was designed the same way, with a 10 pound increase in weight on the 3 sets of squats each day (40 pounds Monday, 50 pounds Thursday) as well as an increase of elevation during the walk to 17.5 on both days. The recorded data from subjects in each group was compared at the beginning and end of the study to determine if the hormone release due to exercising legs two times a week is a variable in the strength and growth of their elbow flexors. The surface EMG also showed if there were any electrical increases while performing these exercises, possibly relating to the increase in hormonal releases through large muscle usage in the legs. Waynesburg University's Strength and Conditioning Coach Dr. Randy Pettit was available during times of physical activity of subject.

INTRODUCTION

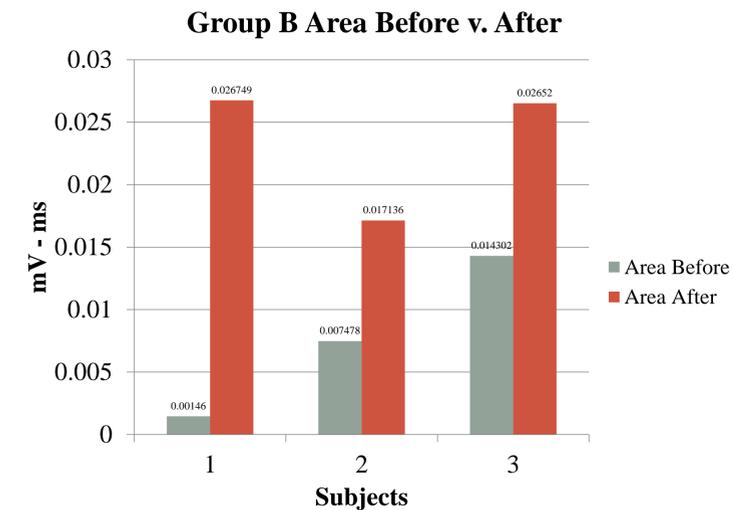
Hormones in the female's body are an essential part for toning and muscle growth. Endogenous hormones are hormones that are growing or produced by growth from deep tissues. Of these important hormones, some include serum growth hormone, testosterone, insulin like growth factor, and serum cortisol. These hormones have the ability to increase protein synthesis, provide anabolic effects, and lead to the initiation of intracellular signaling which stimulates cell growth and proliferation causing muscle hypertrophy. All of these are very important for skeletal muscle anabolism during muscle development.

GOALS

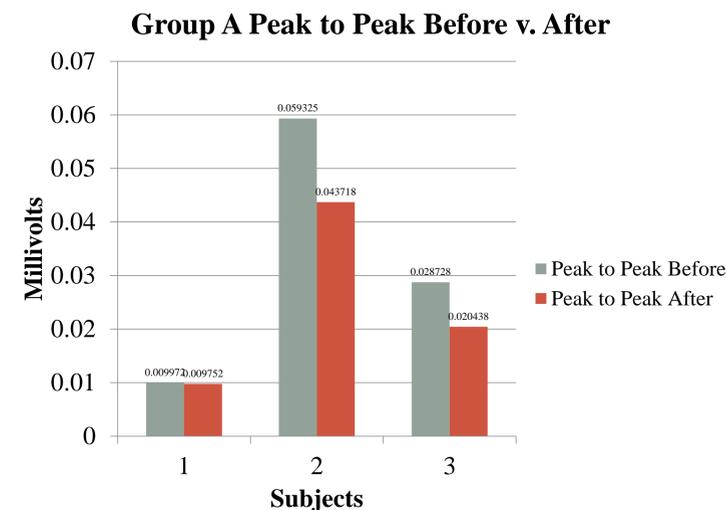
- To determine if the amount of hormones released while doing lower extremity exercises significant enough to affect the growth of the elbow flexor in the upper extremity.
- To relate a surface EMG test to the two fundamental adaptations for muscle growth.
- To correlate the increase of muscle energy using a peak to peak EMG test.
- To correlate the area under a curve using an EMG test via integration.
- Prove that the usage of larger muscle groups can positively affect the growth of smaller muscle groups.



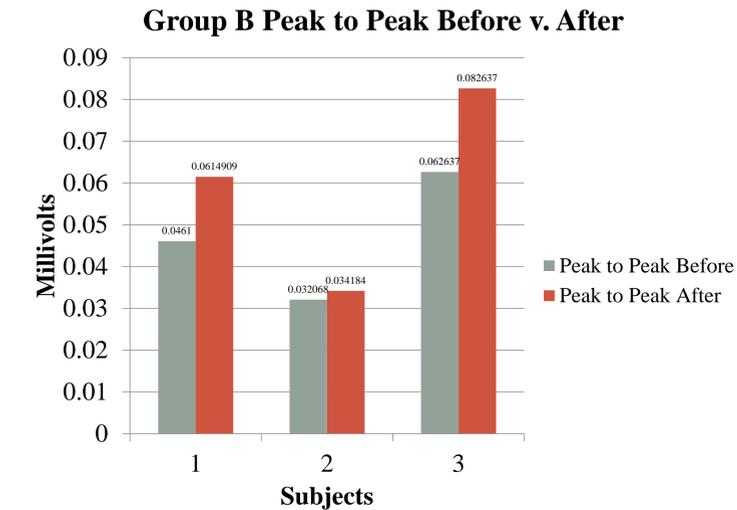
Graph 1: This column graph shows the change of the area under the curve from the beginning of the study to the end in an EMG test for those subjects in group A who strictly exercised the biceps.



Graph 2: This column graph shows the increase of the area under the curve from the beginning of the study to the end in an EMG test for those subjects in group B who exercised the biceps as well as quadriceps



Graph 3: This demonstrates the change in mV from a peak to peak measurement in the first EMG, to a peak to peak measurement in the final EMG in group A.



Graph 4: This demonstrates the increase of mV from peak to peak of the EMG in group B from the beginning to end of the study.

CONCLUSION

Those individuals who participated in quadriceps exercises (squats and incline walking) showed an increase in the electrical output of their biceps in comparison to those who just concentrated on bicep exercises. Both the area and peak to peak measurements increased. These results show a positive connection in the amount of hormone release caused by larger muscles and the effects of these hormones on smaller, non related muscles.

APPLICATION

The purpose of this research was to determine a way to improve the rate of muscle growth naturally through increasing the amount and rate of hormone release. Through this release, the necessary adaptations for muscle growth would occur at a faster and larger rate, ultimately affecting the electrical activity in skeletal muscle. By exercising larger muscle groups, a larger release of the important growth hormones such as insulin like growth factor, testosterone, serum cortisol and serum growth hormone are seen, causing faster protein synthesis and cell proliferation. This knowledge can be used in any training regimen to help increase the ability to gain muscle. It would be interesting to see the phenotypical changes in muscle over a longer period of time using this study. I would predict those who completed quadriceps and bicep exercises over a longer duration of time would show an increase in bicep mass and size faster than those who just performed bicep exercises.

ACKNOWLEDGEMENTS

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