



ENHANCEMENT WITH EMG AND FORCE

Daniel B. Hollander¹, Kurt L. Hester², Jenna M. Fincher¹, Flory Bierma¹, Brandon An¹, Jacqueline A. Thring¹, Alex J. Paille¹, Brandi Decoux¹, and Bovorn Siriukul¹

¹Southeastern Louisiana University, Department of Kinesiology and Health Studies, Hammond, Louisiana, Strength Research Lab

²University of Houston, Department of Athletics, Director of Strength & Performance-Football, Houston, Texas

Introduction

Finding optimal sequences of muscle movements to activate neural and performance parameters remains a central focus for coaches.

One method developed for runners, French Contrast Training, systematically sequences varied speed of movements to elicit post-activation performance enhancement.

French contrast methods (FCM) employ heavy resistance/force, plyometric, weighted plyometric, and assistive exercises sequencing that contrast types of contractions to optimize performance.

Limited data exists to compare these techniques with neural and performance parameters.

Purpose

To compare two routines of FCM on EMG and strength changes the goal was to determine if post activation performance enhancement was realized.

Methods

- 5 participants (3 females, 2 males) completed two french contrast methods (FCM).
- Pre and post tests: 5 second mid-thigh pull with bionomadix wireless Biopac (EMG) recorded activation of specific muscles.
- Programs were performed for 3 rounds
 - Rest intervals were 30 seconds
 - 120 seconds between rounds
 - After completion of each program
 - 3-5 minutes of recovery was given
- Program 1
 - Heavy leg press with 90% of 1-RM (2 repetitions)
 - 6 cone hops
 - 6 trap bar jumps with 30% of body weight
 - 3 resistance sprints for 15 yards
- Program 2
 - 30 second maximal isometric mid-thigh pull
 - 5 kettlebell swings
 - 6 resistance broad jumps
 - 6 recovery broad jumps

Results

For program 1, a slight enhancement of force was observed but a decrease of force was observed for program 2 (see Figure 1). Neither were statistically significant.

However, the EMG data demonstrated that the Vastus Lateralis was significantly more activated than the pre-test measures during program 2 ($t=3.14, p<0.05$).

Age was determined to be a significant factor in the analysis of variance as older participants in this multiple case design trained in mixed modes while younger participants mainly engaged in running.



Conclusions

- The FCM routines impacted EMG more when isometric forces were applied in this sample.
- The sequence of program 2 displayed greater values in activation of the vastus lateralis compared to program 1.
- Statistically, this study was unable to provide conclusive evidence of post activation performance enhancement for FCM.

Practical Applications

Overall, the results demonstrated that French Contrast training sessions resulted in changes in force production and muscle activation. Particularly, the order of movements in the second program that included an isometric component, demonstrated muscle frequency alterations. While results need to be replicated to confirm this finding, preliminary data indicate coaches can incorporate isometric training prior to more dynamic movements to alter muscle firing characteristics. this seems to more effective with running athletes and younger age groups.

