THE EFFECT OF LOCAL VIBRATION ON BICEPS BRACHII AFTER ACUTE FATIGUE

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INTRODUCTION

Fatigue produced by exercise could reduce muscle strength and sports performance, even lead to injuries [1]. How to prevent injuries, and help athletes to shorten recovery time from muscle fatigue is very important. Previous studies show that massage can increase blood flows around the fatigue musle to shorten the recovery time [2]. Local vibration can directly provide muscle mechanical pressures and increase local circulation, which has the same effect as massage [3]. The purpose of this study was to investigate effects of local vibration on the muscle after acute fatigue.

METHODS

Thirteen male subjects (mean age:23.4 yrs) were recruited for this study. Each subject required to attend two test sessions, which were separated by one week. Subjects were randomly assigned to the vibration group or control group at the first session. Subjects were in the vibration group at the first session would be in control group for the second session. At each session, subjects were asked to execute maximum isometric elbow flexions at 90 degree of elbow flexion to induce muscle fatigue. Muscle fatigue was determined by the torque output dropped below 50% of each subject's maximum touque. After fatigue protocol, subjects of the vibration group would recevie a local muscle vibration to biceps brachii of preferred arm for 1 minute. Control subjects were just rest supine without getting any treatment. After each treatment, investigators would obtain subjects' MVC torque and EMG signal immediately and measured again in 5 minutes intervals. All data were synachronal collocted by MP150 system (Biopac Systems, Inc, Goleta, CA). The elbow flexion torque was measurd by isokinetic dynamometer (System III, BIODEX Medicine System, Inc, Shirley, NY). EMG signal was processed with 5-450Hz band pass filter and fast fourier transformation (FFT) transferred to power spectrum to calculate mean frequency (MF) value. Student t tests were used to compare the effects of local muscle vibration on elbow flexion torques and biceps brachii muscle MF.

RESULTS AND DISCUSSION

The elbow flexion torque recovery pattern between vibration and control group were not significant different (Table 1). These results demonstrated that local muscle vibration might not have positive effects on joint torque generation after muscle fatigue. Even 30 minutes after the fatigue protocol, the vibration group and control group still showed no significant different in elbow flexion torques. However, biceps brachii muscle MF of vibration group was found to be significantly greater ($p<0.05$) than control group started from 5 minutes after fatigue protocol (Figure 1).

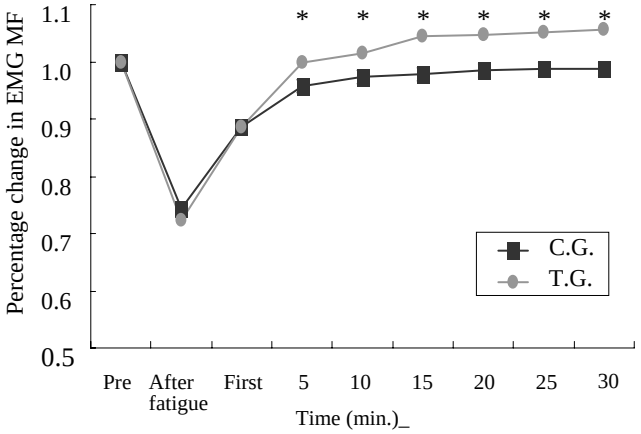

Figure 1: The patterns of EMG mean frequency (MF) before and after treatment. C.G. = control group; T.G.= vibration group; * = $p < .05$

CONCLUSIONS

Acute muscle fatigue could affect neuromuscular activities and joint torque generations. The neural activation of fatigued muscle could be restored in minutes. Local muscle vibration would have positive effects on accelerating recovery of muscle neural activation. However, local muscle vibration might have no effects on joint torque generation after acute muscle fatigue.

REFERENCES

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Table 1: Joint torque of isometric elbow flexion during each measure moment. (mean ± SD)

Torque	Measure moment (minutes)								
(N.M)	Pre	Fatigue	1	5	10	15	20	25	30
T. G.	50.4 ± 9.7	16.2 ± 3.5	38.5 ± 8.9	39.9 ± 9.4	40.3 ± 9.8	40.5 ± 9.1	40.2 ± 9.7	40.1 ± 9.5	40.5 ± 9.3
C. G.	48.8 ± 9.0	17.1 ± 3.0	35.8 ± 9.9	39.4 ± 9.8	38.7 ± 9.9	39.6 ±9.6	39.1 ±9.7	38.7 ± 9.9	38.4 ± 9.8

T.G.= vibration group; C.G.= control group