

Acute Effects of Local Vibration on Muscle Activation, Metabolic and Hormone Responses

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Abstract : The purpose of this study was to investigate the acute effects of local vibration on muscle activation, metabolic and hormone responses. Totally 12 healthy, physically inactive, male adults participated in this study and completed LV exercise session. During LV exercise session, four custom-made vibrations (diameter: 20 mm; thickness: 8 mm; weight: 0.022 g) were locally placed over the belly of the thigh of each subject's non-dominant leg in supine lying position, and subjects received 10 sets for 1 min at the frequency of 35-40Hz, with 1-2 min of rest between sets. The surface electromyography (EMG) were obtained from the vastus medialis and rectus femoris, and the subjects' rating of perceived exertion (RPE) and heart rate (HR) were measured. EMG data, RPE values as well as HR were obtained by averaging the results of 10 sets of each exercise session. Blood samples were drawn before exercise, immediately after exercise, and 15min and 30min after exercise in each session for analysis of lactic acid (LA), growth hormone (GH), testosterone (T) and cortisol (C). The results indicated that the HR did not increase after LV (63.18 ± 3.5 to 63.25 ± 2.58 beat/min, $p > 0.05$). The average RPE values during the LV exposure were at 2.86 ± 0.39 . The root mean square % EMG values from the vastus medialis and rectus femoris were 19.02 ± 2.19 and 8.25 ± 2.20 respectively. There were no significant differences after acute LV exercise among LA, GH and T values as compared with baseline values (LA: 0.68 ± 0.11 to 0.7 ± 0.1 mmol/L; GH: 0.06 ± 0.05 to 0.57 ± 0.27 ng/mL; T: 551.33 ± 46.62 to 520.42 ± 43.78 ng/dL, $p > 0.05$). However, the LV treatment caused a significant decrease in C values after exercise (16.56 ± 1.05 to 11.64 ± 1.85 nmol/L, $p < 0.05$). In conclusion, acute LV exercise only slightly increase muscle activation which may not cause effective exercise response. However, acute LV exercise reduces C level, which may reduce the catabolic response. The probable reason might partly due to the vibration rhythmically which massage on muscles.

Keywords : cortisol, growth hormone, lactic acid, testosterone

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