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Investigation of the Effects of 10-Week Nordic Hamstring Exercise Training and Subsequent Detraining on Plasma Viscosity and Oxidative Stress Levels in Healthy Young Men

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Abstract : Nordic hamstring exercise (NHE) is used to increase hamstring muscle strength, prevent injuries. The aim of this study was to reveal the acute, long-term effects of 10-week NHE, followed by 5, 10-week detraining on anthropometric measurements, flexibility, anaerobic power, muscle architecture, damage, fatigue, oxidative stress, plasma viscosity (PV), blood lactate levels. 40 sedentary, healthy male volunteers underwent 10 weeks of progressive NHE followed by 5, 10 weeks of detraining. Muscle architecture was determined by ultrasonography, stiffness by strain elastography. Anaerobic power was assessed by double-foot standing, long jump, vertical jump, flexibility by sit-lie, hamstring flexibility tests. Creatine kinase activity, oxidant/antioxidant parameters were measured from venous blood by a commercial kit, whereas PV was determined using a cone-plate viscometer. The blood lactate level was measured from the fingertip. NHE allowed subjects to lose weight, this effect was reversed by detraining for 5 weeks. Exercise caused an increase in knee angles measured by a goniometer, which wasn't affected by detraining. 10-week NHE caused a partially reversed increase in anaerobic performance upon detraining. NHE resulted in increment of biceps femoris long head (BFub) area, pennation angle, which was reversed by detraining of 10-weeks. Blood lactate levels, muscle pain, fatigue were increased after each exercise session. NHE didn't change oxidant/antioxidant parameters; 5-week detraining resulted in an increase in total oxidant capacity (TOC) and oxidative stress index (OSI). Detraining of 10 weeks caused a reduction of these parameters. Acute exercise caused a reduction in PV at 1 to 10 weeks. Pre-exercise PV measured on the 10th week was lower than the basal value. Detraining caused the increment of PV. The results may guide the selection of the exercise type to increase performance and muscle strength. Knowing how much of the gains will be lost after a period of detraining can contribute to raising awareness of the continuity of the exercise. This work was supported by PAU Scientific Research Projects Coordination Unit (Project number: 2018SABE034)

Keywords : anaerobic power, detraining, Nordic hamstring exercise, oxidative stress, plasma viscosity
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