EFFECT OF CONCENTRIC CONTRACTION ON MUSCLE FATIGUE AND MUSCLE DAMAGE DEPEND ON MUSCLE TEMPERATURE AND GENDER
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Exercise-induced muscle damage in our case is supported by the findings of other authors showing that well documented indicators of muscle damage include prolonged impairment of muscle function measured during both voluntary and electrically stimulated contractions (Warren et al., 1999), protein leakage from injured muscle fibres, acute inflammation reaction and delayed-onset of muscle soreness, stiffness and swelling (Clarkson, Hubal, 2002). According to Warren et al. (1999), one of the most informative criteria of muscle damage is decrease in muscle force. Though there is no agreement among scholars as to the real mechanism of delayed muscle damage and muscle pain still it has been established that, most frequently, muscle damage and muscle pain arise after performing eccentric exercise (Skurvydas, 1998). It is not clear, however, how muscle damage increases after performing concentric load.

The aim of the present study was to investigate effects of gender and muscle temperature on muscle fatigue and damage after concentric exercise. The participants of the study were 10 healthy male, age: 19 – 23 years; height 177.8 ± 5.8 cm; weight 78.2 ± 6.1 kg, fat 7.5% and 10 female, age: 18 – 23 years; height 166.4 ± 5.6 cm; weight 56.2 ± 6.1 kg, fat 17%. The volunteers performed 50 knee extensions and flexions speed of 180°/s using the isokinetic dynamometer (Biodex). The exercise was performed in control temperature conditions as after leg immersion in water at 15 ± 1°C (30 min) and 44 ± 1°C (45 min) degrees, respectively. Peak torque (Nm) of knee extension and flexion was assessed before the exercise and at 10, 30, 60 min and 24 h of recovery. Before and after muscle cooling or heating and after physical load we measured muscle temperature with needle thermometer. Creatine kinase (CK) activity in blood serum was estimated 1 h prior to load and 24 h after it. Muscle pain was estimated subjectively using a 10-point scale 24 hours after load. There was a significant increase (p < 0.05) in CK activity in blood serum of both men and women 24 h after the exercise in all conditions. A comparison of CK activity in the blood serum of men’s and women’s muscles at control temperature (1 h prior to load) and at their usual temperature 24 h after load has revealed a statistically significant difference (p < 0.05). The difference of CK activity in the blood serum of men (p < 0.05) between muscles at their usual temperature and warmed muscles, and muscles at their usual temperature and cooled muscles.

The evidence obtained in this study showed that both muscle warming and cooling did not cause any changes in the rate of muscle fatigue performing concentric exercise (50 leg extensions/flexions) at average (180°/s) speed.

References

Keywords: Muscle Damage