STRENGTH TRAINING WITHOUT RELAXATION: WHAT ARE THE ADVANTAGES?
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Blood restriction in contracting muscles, associated with noticeable acidosis, is considered to induce hypertrophy of muscle fibers. Blood restriction during work may be achieved by using special type of strength training without relaxation (TwR). The latter means that during rhythmic movements the muscles do not relax at the end points of movement. The aim of the investigation was to compare the effects of 8 weeks classical strength training and of strength training without relaxation upon size, strength and resistance to fatigue of leg muscles in men.

TwR of two intensities – low (50%MVC) and medium (70%MVC) was compared with the classical strength training (loads of 85-90%MVC) in multi-joint and single-joint movements (leg extension and knee extension accordingly).

The duration of training program was 8 wks. The subjects were trained three times a week: once with high load volume and twice with lower loads. The total amount of work performed during 8 wks training of leg extensors in the low intensity TwR-group was two fold lower than in the CT-group and in the medium intensity TwR-group the total amount of work equaled that in the CT-group. After training an increase of maximal voluntary contraction in isotonic regime (1 RM) by 21 and 34% was recorded for low intensity TwR- and CT-groups accordingly, but if related to the training load used, the increment in low intensity TwR-group was 1.3 fold higher than in CT-group. If training intensity during TwR was medium the MVC increments were practically the same for the TwR- and CT-groups – 31 and 36% accordingly. The maximal isokinetic torques of knee extensors increased in a similar way – up to 10-12% – for both CT- and TwR-groups. IEMG-activity during maximal torques had a tendency for an increase after CT and somewhat decreased after TwR. Resistance to fatigue of knee extensors did not change or even decreased after 8 wks training in CT-group and significantly increased in TwR-groups.

The increases of m. quadriceps femoris volumes estimated from MRI were comparable after two training regimes: after low intensity TwR the increase of muscle size was somewhat lower than after CT and after medium intensity TwR – higher. Two training programs influenced the size of muscle fibers (MF) differently. CT induced a significant increase of cross sectional area (CSA) of fast MF and TwR induced an increase of CSA of slow MF. The mechanism of muscle hypertrophy during training without relaxation may be connected with hormonal changes. Indeed, the training session without relaxation induced considerably greater increases of anabolic hormones (TS, STH, IGF-I) in blood than classical strength training. Metaboreflex origin of these hormonal changes is discussed.

Thus TwR may be a useful tool for inducing in muscle changes of size, strength, and endurance. In some aspects it is more potent than classical strength training. The effects of TwR upon knee extensors turned out to be more pronounced in one-joint training than in multi-joint training.

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