Effects of Variable External Resistance Exercises on Acute Neuromuscular and Hormonal Responses: 1698: Board #231 June 1 3:30 PM - 5:00 PM

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In the past two decades Variable Resistance training (VRT) such as Nautilus Machine (NM) and Elastic Resistance (ER) has gained tremendous popularity among athletes. However, the use of ER in high intensity training protocols has been controversial due to providing low external force.

PURPOSE: to quantify and compare the acute responses in frequency and amplitude of electromyogram signals (EMG) and the concentration of serum Growth Hormone (GH), Testosterone (T) and Lactate (LC) following fatiguing knee extension exercise with ER and NM.

METHODS: In a counterbalance cross-sectional study, nine male (21.08 ± 6.2 yrs) recreationally active subjects completed 5 sets of 10-RM knee extension exercises by ER and NM with three weeks elapse between experiments. Blood sampling, Maximum Voluntary Contraction (MVC) and EMG were recorded before, immediately, 15, 30, and 60-min after termination exercises.

RESULTS: The average of applied forces in NM was significantly higher than ER (509.88 ± 59.66 N vs 266.73 ± 58.56 N) through the 5 sets of dynamic exercises. However, the average force and mean amplitude of MVC as well as the blood concentration of GH, T and LC demonstrated no significant difference between the two types of exercise either in pretest or during recovery period (all p >.05). The serum T showed a significant decrease 60-min after NM compared with pretest (16.2 ± 2.5 vs 22.5 ± 3.2 nmol/L, P =.01); while, GH increased significantly 15-min and 30-min after NM (0.1 ± 0.05 vs 3.9 ± 2.1) and ER (0.2 ± 0.1 vs 3.8 ± 2.1 mIU/L, all p <.01) exercises. The concentration of blood lactate also increased significantly immediately after termination of both exercises and remained elevated up to 30 min post training (all p <.005).

CONCLUSION: Despite considerably less total work completed during ER than NM, similar neuromuscular and anabolic hormonal responses were observed. This could be attributed to higher degree of freedom of lower leg segment during ER (compared with restricted-unidirectional NM lever arm) which might have stimulated proprioceptive pathway and/or changed motor unit activation pattern and in turn facilitated anabolic hormonal secretion. The data supported this idea that in contrary to the classical thought, the exercise intensity should not be defined as magnitude of the load employed but as the rate of the work performed.

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