

## PERCEPTION OF FATIGUE AFTER A VERY MODERATE INTENSITY EXERCISE, PERFORMED ON LEG PRESS

*Alberti G, Limonta E, Scurati R, Gualtieri D*

*Institute of Physical Exercise, Health and Sport Activity, Faculty of Exercise Sciences, University of Milan, Italy*

### **Introduction**

Muscular strengthening exercises performed by patients during rehabilitation, are usually made with very low loads, thinking that determinate low fatigue. About that purpose literature is restricted and the effects of moderate intensity exercises on perception of strain are unknown.

The purpose of this research was to analyse the effect of low strengthening muscular exercises, on the subjective perception of fatigue.

### **Material and methods**

Six male healthy students of Sport Sciences Institute of the University of Milan participated to the study. Their characteristics were: age:  $26 \pm 4$  years, weight:  $66.3 \pm 7.6$  kg, height:  $175 \pm 6$  cm, BMI:  $21.6 \pm 3.0$   $\text{kgm}^{-2}$ .

All subjects were familiar with the exercises of the protocol being students of Sport Sciences institute but they never specifically trained on it.

The exercise was done without previous warm-up. The subjects performed 6 consecutive series of 15 extensions of the lower limbs on horizontal Leg press (Technogym, Gambettola, Italy) with 30 seconds of recovery between series. Every cycle of extension-flexion was performed in 2 seconds that is with frequency of 0.5Hz. During the recovery between series (30 s), the subjects kept the lower limbs short flexed (knee's angle about  $100^\circ$ ) with foots ground on press. The exercise was performed using subsequent loads of 20, 30 and 40 kg, with one week of rest in between.

During the exercise each subject wear the heart rate monitor (Polar X-trainer Plus, Polar Finland) regulated on 5 second frequency sampling. For each training section the mean heart rates of the last 15 seconds were considered.

Before starting and 5 minutes after the end of each session, the arterial pressure was measured and capillary blood lactate concentration was determined (Lactate Analyser YSI Sport). Ten minutes after the end of the session, a same operator presented to the subjects the Borg's scale to value the rating of perceived exertion (RPE).

Data were processed using the descriptive statistics and the differences between effects of different weight have been tested with variance analysis, marking as significant a value of  $P < 0.05$ .

### **Results and discussion**

The results of the study are shown in the table. The proposed exercises produce light, but significant increase of the heart rate (HR), which always remains around relatively low values ( $39 \pm 3\%$  of the maximum theoretic HR). In such exercises, blood lactate concentration tends to decrease, even not significantly, therefore it is possible to hypothesize that the contribution of the aerobic metabolism can be predominant: in fact the used loads were very light and exercises were performed slowly. As expected, systolic arterial pressure increases significantly, while diastolic pressure remains within physiological ranges.

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# The Rehabilitation of Sports Muscle and Tendon Injuries

Load (kg)	Weight (%1RM)	Total load (kg)	HR pre (bpm)	HR post (bpm)	AP pre (mmHg)	AP post (mmHg)	Lactate pre (mM)	Lactate post (mM)	RPE
20	11±1	1800	54±3	75±9***	125/82 ±9/3	137/82 ±12/13	0.44±0.15	0.37±0.09	1.0±0.0
30	16±2	2700	55±4	70±6***	115/72 ±9/3	130/77 ±10/8	0.51± 0.12	0.46± 0.15	2.3±0.6***
40	22±3	3600	54±3	75±10***	123/78 ±10/3	132/75 ±10/5	0.49± 0.15	0.45± 0.12	3.7±0.6***

Table 1: loads, heart rate (HR), arterial pressure (AP), blood lactate before (pre) and after (post) exercises and rating of perceived exertion (RPE), 10 minutes after exercise.

Heart rate, blood lactate and arterial pressure resulted similar after exercises performed with the three different loads. These loads have to be considered very much low if compared with subject's potentiality, indeed.

Contrarily to what observed about physiological parameters, RPE resulted related to the increase of the load. Then RPE would be a very sensible variable, since it experienced significant modifications after the training performed with different, but very low loads.

## Conclusions

Muscular strengthening exercises, performed with loads lower than 25% of 1RM, that are usually proposed to patients during rehabilitation, determinate a subjective perception of exertion that can be easily identified, by RPE scale. This situation is difficult to assess by measuring HR, blood lactate or arterial pressure and must be considered when such exercises are purposed to patients during rehabilitation.