4th National Congress of the Italian Society of Physiotherapy – Florence, May 24-25, 2014

A TIME COURSE STUDY ON STRENGTH TRAINING IN MULTIPLE SCLEROSIS

G. Mureddu[1], A. Manca[2], D. Dragone[2], G. Bua[1] and F. Deriu[2]

(1) O.U. of Neuromotor Rehabilitation, Policlinico Sassarese, Sassari, Italy
(2) Department of Biomedical Sciences, University of Sassari, Sassari, Italy

FISM 2013/R/11

BACKGROUND AND OBJECTIVES

Muscle weakness and fatigue dramatically affect the overall quality of life (QoL) of patients with multiple sclerosis (MS). Research has shown that maximal resistance training has a significant positive effect on the performance of daily living activities in people with MS, resulting in increased QoL[1].

Several methods are currently employed for reducing strength impairment in MS but no one regimen has been portrayed as superior to others; moreover, the optimal "dose-response" relationship is still debated[2].

Aim of the present study was to investigate the time course of strength changes induced by resistance training in MS.

METHODS

Design: pre-test/post-test one sample study.

Subjects: eight patients with relapsing-remitting MS (5 females, 3 males; 46.5 ± 11.2 years old; 64.5 ± 14 kg) and a strength asymmetry between the ankle dorsiflexor muscles.

Intervention: six-week unilateral isokinetic/concentric training (3 times/week for a total of 18 sessions at two angular velocities: 45 and 10°/s) of the weaker tibialis anterior muscle.

Measurements: peak torque (PT: at 45°/s and 10°/s) and total work (TW: 30 repetitions at 180°/s) measured on a Biodex isokinetic dynamometer before (baseline), after 3 weeks (intermediate) and after 6 weeks (post) of resistance training.

Analysis: repeated-measures analysis of variance.

RESULTS

Compared to baseline, data showed that: 1) at 45°/s PT increased by 23.2% at 3 weeks ($p<0.05$) and by 10.2% at 6 weeks ($p>0.05$) of training; 2) at 10°/s PT increased by 24% at 3 weeks ($p<0.05$) and by 5.9% at 6 weeks ($p>0.05$); 3) TW increased by +69.8% after 3 weeks ($p<0.05$) of training and by 33.9% at 6 weeks ($p>0.05$).

Notably, when comparing post to intermediate assessments both PT and TW decreased significantly (PT: -11% and -14.6% at 45°/s and 10°/s, respectively; TW: -35.9%, $p<0.05$).

Strength gain is significant both at 45 and 10°/s

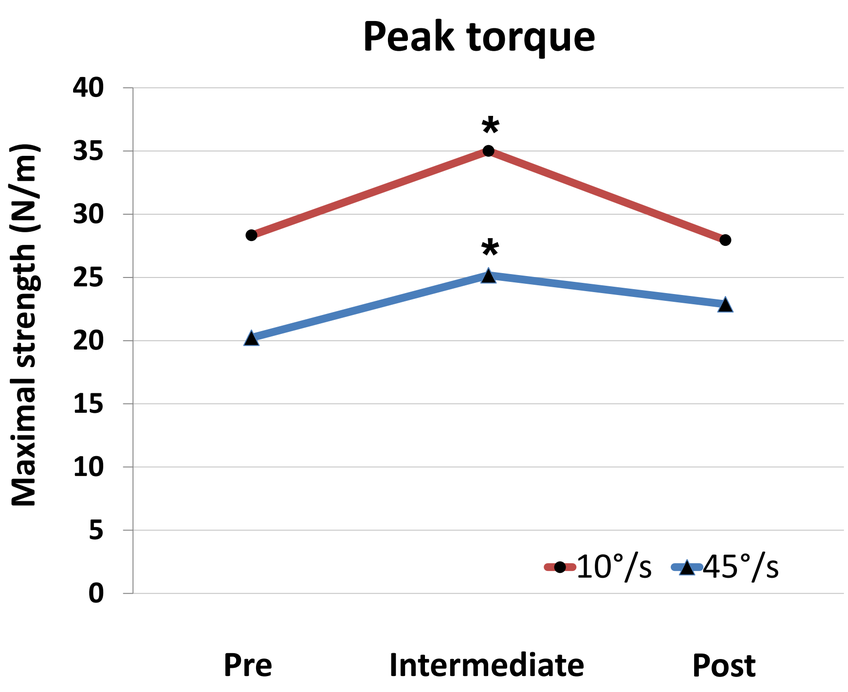

Figure 1. Tibialis anterior maximal strength (peak torque) at 45°/s and 10°/s of angular speed of the weaker leg following unilateral isokinetic training. N/m = Newton/meter; *Significant for $p < 0.05$. Data are presented as mean ± SD.

Gains in strength are likely to impact on work endurance

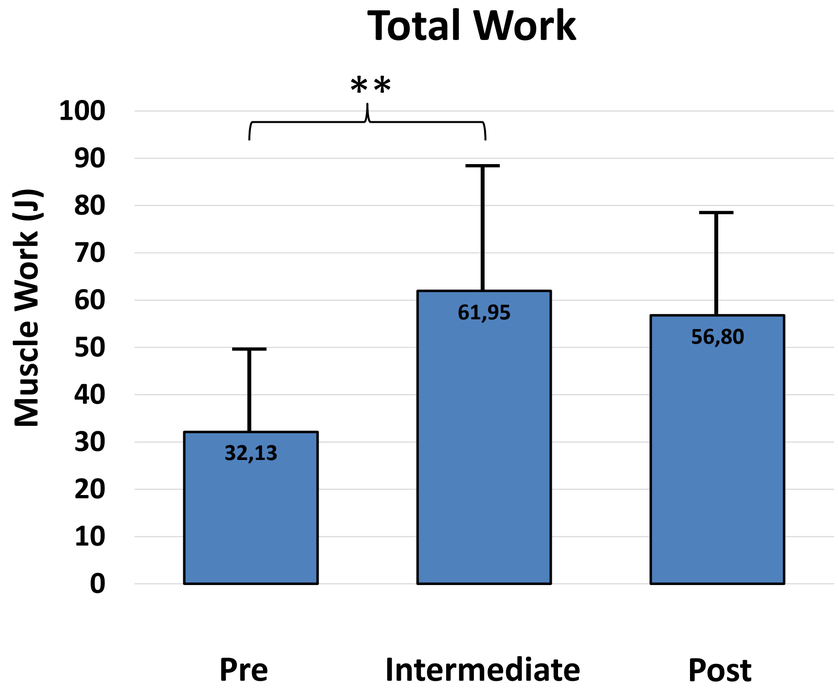

Figure 2. Tibialis anterior total work in a 30-repetition bout at 180°/s of angular speed of the weaker leg following unilateral isokinetic training. J = joules; **Significant for $p < 0.01$.
Data are presented as mean ± SD.

CONCLUSIONS

These preliminary data showed that a 6-week resistance training was effective in increasing maximal strength and work endurance in patients with multiple sclerosis. However, after a significant initial improvement in muscle performance a trend to plateau occurred. This suggests that intensive and short training periods might be more cost-effective than long lasting protocols, which are not likely to induce additional gains in strength. Further studies are needed to clarify how muscle performance can be improved best-dealing with fatigue.

REFERENCES

1. Kjølhede, T., Vissing, K. & Dalgas, U. 2012, "Multiple sclerosis and progressive resistance training: A systematic review", *Multiple Sclerosis,* vol. 18, no. 9, pp. 1215-1228.
2. Rietberg, M.B., Brooks, D., Uitdehaag, B.M.J. & Kwakkel, G. 2009, "Exercise therapy for multiple sclerosis", *Cochrane Database of Systematic Reviews*, no. 4.

Keywords: Resistance training - Multiple Sclerosis - Cost-effectiveness – Isokinetic methods

This work was supported by the Italian Foundation for Multiple Sclerosis (FISM 2013/R/11)