Abstract

Effect of eccentric hamstring contractions at short and long length on delayed onset muscular soreness (DOMS)

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\textbf{Introduction:} Unaccustomed strenuous contractions are known to induce delayed onset muscular soreness (DOMS). DOMS is a complex of symptoms, namely pain on movement, tenderness and stiffness, and sometimes swelling. DOMS sensations occur a few hours after the effort and reach a peak after 24–48 hours, and last 5 to 7 days after the exercise. Those pains are constantly associated with massive plasma release of creatine kinase (CK) and myoglobin (Mg). The aim of the study was to investigate the effect of the muscle length on the development of the DOMS and on the CK and Mg plasma release after eccentric effort. Thus the objective of this has been accomplished by comparing two hip positions which place the hamstrings at two different lengths.

\textbf{Materials and Methods:} Eight healthy moderately active males participated in the study. The age range was 18–30 years.

The tests were performed using a Cybex Norm. Testing comprised 3 concentric contractions of the hamstring and quadriceps muscles and 4 eccentric hamstring contractions at 60\textdegree/sec speed on supine and seated position with a range of motion of 105\textdegree. Fifteen days later they performed the first provocation test. That test consisted of 5 series of 5 maximal eccentric contractions of the hamstring. There was an interval of at least 30 days between the two provocation tests, one in supine and one in seated position, and the order of the two exercise sessions was randomly assigned. Blood samples were taken before and 24 h, 48 h and 72 hours after the exercise. Perception of muscle soreness during functional activities was assessed before and 24 h, 48 h and 72 h after the exercise by using a visual analogic scale (VAS). A non parametric paired Wilcoxon test was used to analyze the results.

\textbf{Results:} For hamstring a comparison of peak torque values for the supine and seated positions revealed significant differences ($p = 0.01$).
Peak torque value was greater in the seated position (198 Nm) than in the supine position (107.7 Nm) this is in accordance with Worrel [2] results. Total work was statistically lower in the supine position during the provocation test than in the seated position. CK and Mg showed a significant increase for the supine and seated tests 48 hours after eccentric exercise. Nevertheless, CK (Fig. 1) and Mg were higher after the test in the seated position. We have also found a great intersubject variability in the CK and Mg response which confirms the theory of the “high and low responders” developed by Clarkson et al. [1].

Soreness showed a peak 48 hours after exercise (Fig. 2) and all the subjects felt more pain in the seated position than in the supine position.

**Conclusion:** We suggest that exercising the muscle in the shortened position develops less DOMS than in the lengthened position because the tension is less important in the contractile and the elastic components.

**References**
