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THE EFFECT OF CRYOTHERAPY ON THE RECOVERY OF INDUCED MUSCLE DAMAGE ON ELBOW FLEXORS

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SUMMARY

The aim of this study was to evaluate the effects of local cryotherapy in the recovery of induced muscle damage on elbow flexors. The sample consisted in 9 healthy women untrained in strength, with ages between 18 and 30 years. Data collection for each subject lasted 5 days. On day one, the eccentric protocol of damage induction was carried out, and isometric strength production, muscle pain, muscle thickness and echo intensity were evaluated. The evaluations took place before and immediately after the eccentric protocol of damage induction. Local cryotherapy was applied two times a day for 20 minutes. On the following days (24h, 48h, 72h and 96h), the same evaluation from day one was repeated. For statistical analysis, the ANOVA two-way test was performed. Results suggest there is no significant difference between groups in any of the variables. The echo intensity analysis demonstrated that, in 96h, the control group was equal to day one, while on the intervention group there was a difference. Such difference suggests that the cryotherapy delayed recovery of muscle damage.

INTRODUCTION

The use and the effects of cryotherapy on muscle damage have been explored in literature. Studies with cold water immersion and local cryotherapy in animal muscle damage have demonstrated its positive effect in the restoration of endothelial integrity and improvement of mechanical properties [1,2].

Studies with human subjects showed that the cold water immersion immediately after intense activity was associated with reduction in some indices of induced muscle damage [3,4]. However, there are few studies approaching local cryotherapy – a method more commonly used and of easier application.

The purpose of this study was to evaluate the effects of local cryotherapy in the recovery of muscle damage on elbow flexor muscles (biceps brachialis and brachialis) generated from an eccentric protocol of damage induction.

METHODS

The sample was composed by 9 healthy women untrained in strength, with ages between 18 and 30 years. All subjects were tested in both arms, which were randomized as control and experimental arms. The variables analyzed were maximal voluntary isometric contraction (MIVC), muscle pain, muscle thickness and echo intensity.

The data were collected in 5 days. On day one, the eccentric protocol of damage induction was carried out. The protocol was performed on an isokinetic dynamometer and was composed by 2 sets of 10 repetitions of the maximal eccentric contraction.

Before and immediately after the protocol, using an isokinetic dynamometer, data on the maximal voluntary isometric contraction (MVIC) of the elbow flexors in an angle of 60° were collected. Muscle pain was evaluated through visual analog scale in two situations: palpation and flexion-extension movement. Muscle thickness and echo intensity of the elbow flexors (biceps brachialis and brachialis) were obtained with an ultrasound apparatus.

The local cryotherapy was applied two times a day for 20 minutes with a minimum 6 hours interval between sessions. The first session was always carried out immediately after evaluations. The same evaluation process from day one was repeated on the following days – 24h, 48h, 72h and 96h after eccentric protocol of damage induction.

The statistical analysis was made through the Shapiro Wilk test for data normality and the ANOVA two-way test for significant differences on the indirect variables of muscle damage between control and experimental arms and between the different times (before the protocol, 24h, 48h, 72h, and 96h). When necessary the post-hoc LSD test was used to identify differences. The level of significance adopted for this study was 0.05.

RESULTS AND DISCUSSION

Results suggest there is no significant difference between groups in any of the variables. Assessing the variables according to time, it was found that muscle strength and

muscle thickness were different before intervention comparing to the other moments (24h, 48h, 72h, 96h), in both control and intervention. Both muscle pain measures before intervention were different than those from 24h, 48h and 72h after the protocol (Table 1). The echo intensity analysis, however, demonstrated that, in 96h, control was equal to day one, while in the intervention there was difference between day one and 96h (Figure 1). This suggests that cryotherapy delayed muscle damage recovery.

Tseng et al. [5] investigated the effect of topic cooling in induced muscle damage. The authors found that the intervention group appears to not benefit from the cooling, presenting a higher level of creatine kinase (CK) compared to the control at 72h following intervention. This finding corroborates with this study, as both of them found higher values of variables related to inflammation on the group that received intervention. Sellwood et al. [6] investigated the effect of cold water immersion versus immersion in tepid water (control), and also found that the use of cold as a therapy was ineffectual in minimizing muscle damage symptoms.

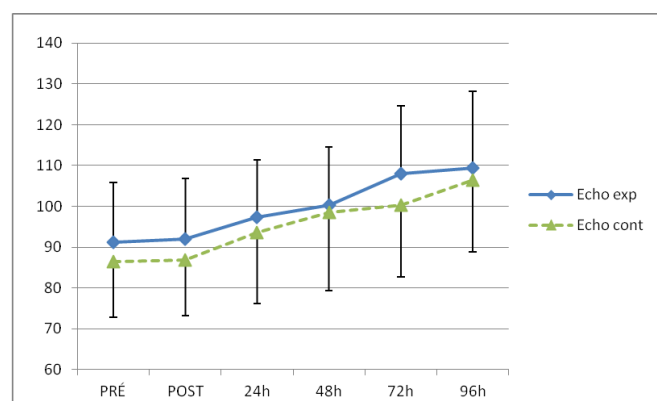


Figure 1: Data from echo intensity. (Echo exp: echo intensity experimental group; Echo cont: echo intensity control group).

Table 1: Values of the variables through time.(MT: muscle thickness; MVIC: maximal isometric voluntary contraction; PAIN F/E: pain during flexion-extension; PAIN P: pain during palpation).

	PRE		POST		24h	
	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL
MT	25,71 (± 3,65)	25,11 (± 3,24)	28,51 (± 4,16)*	27,35 (± 3,85)*	28,63 (± 4,22)*	27,53 (± 4,12)*
MVIC	26 (± 7,12)	26,67 (± 5,61)	18,55 (± 4,16)*	19,22 (± 4,58)*	20,44 (± 6,84)*	21,11 (± 5,09)*
PAIN F/E	0 (± 0)	0 (± 0)	11,37 (± 15,71)	13,75 (± 21,22)	24,75 (± 21,10)*	29,50 (± 21,14)*
PAIN P	0 (± 0)	0 (± 0)	7,37 (± 11,95)	11,13 (± 21,22)	25,13 (± 25,07)*	24,50 (± 21,14)*
	48h		72h		96h	
	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL
MT	29,13 (± 4,83)*	27,56 (± 4,44)*	29,72 (± 4,92)*	28,30 (± 4,67)*	29,41 (± 5,13)*	27,59 (± 4,14)*
MVIC	20,44 (± 7,73)*	22,11 (± 9,84)*	21,77 (± 7,60)*	21,78 (± 8,11)*	22 (± 8,20)*	21,22 (± 8,21)*
PAIN F/E	44,12 (± 24,67)*	37,13 (± 30,09)*	29,75 (± 16,10)*	24,25 (± 24,68)*	10,37 (± 16,45)	9,00 (± 15,97)
PAIN P	35,75 (± 26,68)*	35,25 (± 30,09)*	22,50 (± 18,43)*	19,50 (± 24,68)*	7,12 (± 15,46)	12,00 (± 15,97)

*significant difference related to PRE (p<0.05)

CONCLUSIONS

The findings of this study support that the use of local cryotherapy does not improve muscle damage recovery. Echo intensity data could even suggest that the use of cryotherapy would delay the muscle recovery.

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