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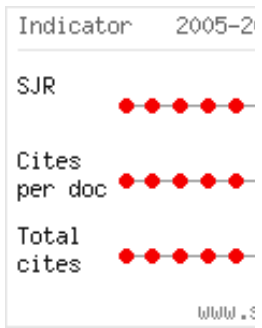
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Cryotherapy post-  
training reduces  
muscle damage  
markers in jiu-jitsu  
fighters

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## Abstract

Although widely used in sports, the efficiency of cryotherapy in reducing muscle damage has been questioned. The present study investigated the acute effects of post-exercise cryotherapy on the expression of creatine phosphokinase (CPK) and lactate dehydrogenase (LDH), perceived pain, and muscle strength of the upper limbs in Brazilian jiu-jitsu competitors. Nine highly trained fighters were subjected to two 90-minute training sessions. After the first session, five random subjects were immersed in a pool with ice ( $5 \pm 1^{\circ}$  C) for nineteen minutes, and the remaining participants were allocated to the control group.

The treatments were reversed in the second session (cross-over design). Analysis of covariance with repeated measures was used to compare outcomes between the groups, and pre-test measures were used as covariates. Pearson's correlation was adopted to check the strength of the associations between variables. The results showed lower serum CPK concentrations ( $P < 0.05$ ) in the cryotherapy group ( $504.0 \pm 138.7$  IU/L) compared to the pre-exercise ( $532.6 \pm 67.9$  IU/L) group, and a similar result was observed for LDH ( $517.4 \pm 190.3$  vs.  $601.8 \pm 75.7$  IU/L).

Cryotherapy resulted in lower ( $P < 0.05$ ) perceived pain ( $2.2 \pm 1.6$  vs.  $4.2 \pm 1.9$ ) and body temperature ( $34.2 \pm 1.3^{\circ}$  C vs.  $36.3 \pm 0.7^{\circ}$  C), and an attenuated loss of isometric strength ( $53.1 \pm$

18.1 s vs.  $42.9 \pm 14.5$  s).

Perceived pain was directly associated ( $P < 0.05$ ) with CPK ( $r = 0.59$ ) and LDH ( $r = 0.475$ ) levels. The results show that post-exercise cryotherapy resulted in lower serum CPK and LDH, hypoalgesia, and greater preservation of isometric strength endurance when compared to the control condition.

Key words: COLD WATER IMMERSION; MARTIAL ARTS; CREATINE KINASE; L-LACTATE DEHYDROGENASE; MUSCLE STRENGTH

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