

The influence of cold water immersion on markers of recovery following resistance exercise.

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The use of cold water immersion (CWI) as a recovery intervention is prevalent amongst athletes. Performance of high volume, heavy load resistance exercise is known to result in disturbances of muscle function, perceptual responses and blood borne parameters. Therefore, the aim of this study was to investigate the influence of CWI on markers of recovery following an acute resistance exercise session. With institutional ethics approval, 16 men (mean age: 24 ± 4.7 years; stature: 2 ± 0.05 m; body mass 85 ± 13.5 kg) completed a lower body resistance exercise session (120 repetitions total) comprising back squats, split squats, hip thrusts and Romanian deadlifts, all performed at 80% predicted 1RM. Participants were match paired into either 10 min CWI (10 ± 0.5 °C) ($n=8$) or a placebo group ($n=8$) based on a ratio of predicted 1RM and lean mass. Perceptions of soreness and training stress, markers of muscle function and efflux of intracellular proteins were assessed before, and at 24, 48 and 72h post exercise. All data were analysed using magnitude based inferences and 90% confidence intervals. The exercise session resulted in increased muscle soreness, disturbances of muscle function and increases in plasma markers of muscle damage. For perceptions of muscle soreness, there was a possibly trivial effect of CWI at all time points compared to placebo. For isometric peak force there was a possibly harmful effect of CWI at 48h post ($-11.5; \pm 19.6\%$) (mean; \pm CL) compared to placebo. For countermovement jump height there was a possibly harmful effect of CWI at 48h ($-3.80; \pm 10.8\%$) and 72h ($-3.90; \pm 10.6\%$) post exercise compared to placebo. CWI had a possibly harmful effect on the efflux of creatine kinase (CK) at 24h post ($1.53; x/\div 1.881$) (mean; x/\div CL) and a likely harmful effect at both 48h ($1.78; x/\div 1.898$) and 72h ($2.04; x/\div 1.836$) post compared to placebo. These results suggest that CWI is not effective at attenuating increases in perceptions of muscle soreness after resistance exercise when compared to a placebo intervention. Further, CWI has a detrimental effect on the CK response, as well as the recovery of isometric peak force and vertical jump performance. The implications of these findings should be carefully considered by athletes and practitioners employing CWI as a recovery strategy following heavy load resistance training.

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