Effetti della Crioterapia Post-Esercizio sulle Caratteristiche del Recupero Muscolare: Review Sistematica e Meta-Analisi

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L'allenamento produce una reazione infiammatoria da parte del corpo che si sviluppa in base all'intensità alla quale i soggetti lavorano. La crioterapia è una terapia post-esercizio utile per alleviare la fatica e i DOMS riducendo l'infiammazione grazie al suo effetto vasocostrittore. Negli ultimi decenni le terapie di raffreddamento risultano essere state utilizzate ampliamente nello sport.

L'obiettivo di questo studio è di mettere a confronto le diverse terapie del freddo con le strategie di recupero passivo post-esercizio, valutando gli effetti sino a 96 ore dalla fine di diversi tipologie d'esercizio (es. partite di calcio, sprint, test di Resistenza da campo o effettuatati al cicloergometro).

Questa indagine è stata svolta eseguendo una ricerca sistematica analizzando tutti gli articoli scientifici pubblicati tra ottobre 2013 e agosto 2014 su 3 motori di ricerca specializzati (PubMed, SportDiscus e PEDro), seguendo le linee guida PRISMA.

In questo studio le variabili soggettive valutate sono state: il DOMS (dolore muscolare post esercizio) e la RPE (Scala di percezione dello sforzo). Uno degli obiettivi della meta-analisi è stata la valutazione dei marker plasmatici, nello specifico: la creatin chinasi (CK) come indice del danno muscolare; il lattato muscolare; il lattato deidrogenasi (LDH) come enzima marcatore non specifico dei danni cellulari; le citochine (IL-6, CRP) in quanto cellule adipose in grado di produrre risposte infiammatorie.

Nei vari studi la terapia più utilizzata è stata quella dell'immersione in acqua fredda (CWI) delle gambe con temperatura compresa tra i 5°C e i 10°C e in altri casi tra gli 11°C e i 15°C.

È stata utilizzata anche la cryosauna (WBC) a temperature di -110°C, -60°C e -10°C e gli impacchi di ghiaccio sulle gambe in diverse modalità. I gruppi di controllo hanno utilizzato strategie di tipo passivo in ambienti con temperature tra i 15°C-24°C. Altre condizioni sono state: un placebo, l'integrazione di carboidrati, l'assunzione di bevande ed esercizi di stretching.

Questo studio ha evidenziato che le terapie di raffreddamento riducono significativamente i DOMS rispetto al gruppo di controllo a distanza di 24 ore dall'allenamento, con effetti presenti sino a 96 ore dopo (4 giorni). Le terapie del freddo risultano avere effetti positivi a livello generale, ma non si evidenzia una correlazione tra le temperature utilizzate durante il trattamento e la diminuzione dei sintomi negativi.

L'immersione in acqua fredda è il metodo più utilizzato (rispetto ad aria fredda, impacchi ghiacciati, cryosauna) e riduce maggiormente i DOMS, oltre a favorire una riduzione del RPE in maniera statisticamente significativa rispetto ai gruppi di controllo, ma solo fino a 24 ore. Dalle 48 ore in poi non si evidenziano differenze significative tra le modalità di raffreddamento.

Il trattamento non influisce sui marker infiammatori (lattato, CK e IL-6) nelle successive 72 ore di recupero, e nessuno di essi era significativamente ridotto a 48 ore, con l'eccezione della differenza significativa nei livelli di CRP.

È stato evidenziato che il tempo di raffreddamento per alleviare i sintomi è 13 minuti circa (range: da 10 a 24 min), la temperatura più efficace è di circa 10°C (range: da 5°C a 13°C), individualizzando la temperatura ideale in rapporto al tessuto adiposo.

I trattamenti WBC e aria fredda probabilmente non hanno la stessa capacità di raffreddamento, che risulta essere più profonda nei trattamenti a contatto diretto con la pelle. Nel caso gli atleti partecipino ad allenamenti intensi e le sedute siano ravvicinate tra loro possono trarre beneficio dalla crioterapia.

Punti chiave:

- Secondo gli studi analizzati l'utilizzo della crioterapia ha effetti significativi rispetto alle strategie di recupero passivo.
- I dati emersi da questa meta-analisi evidenziano che la CWI ottiene effetti migliori rispetto alle altre tecniche di raffreddamento, con una riduzione dei sintomi di DOMS (fino a 96 ore) e RPE (fino a 24 ore).
- I dati emersi da questa meta-analisi evidenziano che con il trattamento di CWI a distanza di 48 ore a livello ematico solo i CRP subiscono modifiche significative.
- Deve essere infine considerato che le varie strategie di raffreddamento potrebbero influenzare le diverse caratteristiche di recupero.

The Effect of Post-Exercise Cryotherapy on Recovery Characteristics: A Systematic Review and Meta-Analysis

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PURPOSE: The aim of this review and meta-analysis was to critically determine the possible effects of different cooling applications, compared to non-cooling, passive post-exercise strategies, on recovery characteristics after various, exhaustive exercise protocols up to 96 hours (hrs).

METHODS: A total of n = 36 articles were processed in this study. To establish the research question, the PICO-model, according to the PRISMA guidelines was used. The Cochrane's risk of bias tool, which was used for the quality assessment, demonstrated a high risk of performance bias and detection bias. Meta-analyses of subjective characteristics, such as delayed-onset muscle soreness (DOMS) and ratings of perceived exertion (RPE) and objective characteristics like blood plasma markers and blood plasma cytokines, were performed.

RESULTS: . Pooled data from 27 articles revealed, that cooling and especially cold water immersions affected the symptoms of DOMS significantly, compared to the control conditions after 24 hrs recovery, with a standardized mean difference (Hedges' g) of -0.75 with a 95% confidence interval (CI) of -1.20 to -0.30. This effect remained significant after 48 hrs (Hedges' g: -0.73, 95% CI: -1.20 to -0.26) and 96 hrs (Hedges' g: -0.71, 95% CI: -1.10 to -0.33). A significant difference in lowering the symptoms of RPE could only be observed after 24 hrs of recovery, favouring cooling compared to the control conditions (Hedges' g: -0.95, 95% CI: -1.89 to -0.00).

CONCLUSIONS: There was no evidence, that cooling affects any objective recovery variable in a significant way during a 96 hrs recovery period.

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