Study Protocol

Title: Assessment of adaptive effects of diversified recovery strategies among individuals with different levels of motor preparation

Acronym: ARM

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Abstract

This interventional, randomized controlled trial (RCT) evaluates the effects of different recovery strategies on adaptation among physically trained and untrained individuals. Interventions include cold compression therapy, ischemic preconditioning, and contrast therapy, assessed against a control group. Outcomes will be measured at baseline, 2 weeks, 8 weeks, and 6 months, including biochemical, biomechanical, and subjective recovery parameters. The study aims to identify the most effective strategies to support recovery, performance, and injury prevention.

Background and Rationale

Recovery strategies play a crucial role in supporting adaptation, reducing injury risk, and improving performance among athletes. Despite growing interest, evidence comparing modalities like cold compression, ischemic preconditioning, and contrast therapy remains limited. This study aims to address these gaps by assessing their effectiveness across amateur and professional populations.

Study Objectives

1. Compare the effects of recovery interventions on physiological and biomechanical outcomes.

2. Determine whether adaptation differs between amateur and professional participants.

3. Evaluate changes in subjective fatigue and pain levels post-intervention.

Study Design

This is a multicenter, interventional randomized controlled trial (RCT) with parallel and crossover components. Participants will be randomized into four groups: cold compression, ischemic preconditioning, contrast therapy, and control. Blinding applies to participants and assessors where feasible.

Participants

Inclusion criteria: Ages 18-45, medically cleared for training, with defined amateur or professional training background.

Exclusion criteria: Recent injury, surgery, cardiovascular conditions, use of medications affecting hemodynamics, or refusal of consent.

Target number: 100 participants.

Interventions

GR-C: Cold compression therapy using Game Ready system.

GR-IPC: Ischemic preconditioning protocol.

GR-KT: Contrast therapy alternating heat and cold.

GR-K: Control (no intervention or sham).

Outcomes

Primary outcomes include serum markers (CK, CRP, IL-6, etc.) and biomechanical assessments (muscle stiffness, MVC, EMG, etc.).

Secondary outcomes include subjective fatigue, pain scales, and recovery perception measures.

Data Collection Timepoints

Outcomes will be measured at baseline, 2 weeks, 8 weeks, and 6 months.

Randomization and Blinding

Randomization is block-based with stratification by age, gender, and training level. Single-blinding is used for participants; assessors are blinded.

Statistical Analysis Plan

Comparative analyses will use appropriate parametric/non-parametric tests. ANOVA or repeated measures analyses will evaluate changes over time. A p-value <0.05 will be considered statistically significant.

Ethics and Consent

Approved by the Ethics Committee for Scientific Research of Physiotherapists at the Polish Physiotherapy Association (Resolution No. 1/06/2025). Written informed consent is required from all participants.

Data Management

Data will be stored securely, anonymized, and accessible to authorized personnel only. IPD will be shared upon request post-study with appropriate approvals.

Funding and Conflicts of Interest

This is an investigator-initiated and funded study. The investigator declares no conflicts of interest.