INPLASY PROTOCOL

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Effects of post-activation potentiation strategies on endurance performance: a systematic review protocol

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Review question / Objective: The current systematic review and meta-analysis will investigate a) the quality of evidence for the post-activation potentiation strategies effects on endurance performance, b) assessing the effect size of different post activation potentiation strategies in improving endurance performance.

Condition being studied: Post-activation potentiation (PPA) is a phenomenon related to the acute and transient muscle function responses that potentiates muscle contractions, likely due to the phosphorylation of light chain myosin. This phenomenon is thought to lead to an improvement in exercise performance.

Information sources: The search will be made in the following databases: Medline-Pubmed; EMBASE; BVS; sportdiscus. Grey literature will be retrieved from Google Scholar; Open grey and studies published in preprint databases (SportRxiv e MedRxiv), and registration protocols (ClinicalTrial.gov e REBEC). In addition, a manual search will be conducted in the reference list of the included studies and eventual contact with the authors will be made in case of relevant missing data.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 16 July 2021 and was last updated on 16 July 2021 (registration number INPLASY202170049).

INTRODUCTION

Review question / Objective: The current systematic review and meta-analysis will investigate a) the quality of evidence for the post-activation potentiation strategies effects on endurance performance, b) assessing the effect size of different post activation potentiation strategies in improving endurance performance.

Rationale: The sports sciences literature has shown that prior exercise-derived post activation potentiation (PAP) effects may improve performance in different types of sport-based exercises, mainly those that

require speed, strength and explosive characteristics. However, PAP effects on endurance sport-based exercises such as cycling, running, rowing, etc. were fully described. In this regard, athletes competing in endurance sports need to maintain the highest exercise intensity as possible without the occurrence of premature fatigue that harms performance. Hence, the capacity in maintaining a submaximal intensity for a prolonged period of time is limitant for a successful endurance sport performance. Although separate studies evidencing a PAP phenomenon in endurance sport-based exercises, none has tried to evaluate the quality of PAP evidence nor to summarize the PAP effects on endurance performance.

Condition being studied: Post-activation potentiation (PPA) is a phenomenon related to the acute and transient muscle function responses that potentiates muscle contractions, likely due to the phosphorylation of light chain myosin. This phenomenon is thought to lead to an improvement in exercise performance.

METHODS

Search strategy: Medline by Pubmed; EMBASE; BVS; sportdiscus; warm up AND sports OR exercise AND Physical Endurance OR Endurance Training AND NOT; Basketball OR Baseball OR Boxing OR Cricket Sport OR Football OR Golf OR Gymnastics OR Hockey OR Martial Arts OR Mountaineering OR Racquet Sports OR Skating OR Return to Sport OR Soccer OR Team Sports OR Volleyball OR Weight Lifting OR Wrestling.

Participant or population: Healthy humans.

Intervention: Warm-Up Exercise, Postactivation potentiation, PAP, Conditioning contraction, Conditioning activity, Post activation potentiation, PAPE, post activation performance enhancement.

Comparator: Control condition.

Study designs to be included: Original papers.

Eligibility criteria: Original papers dealing with healthy humans that performed either a warm-up exercise or any prior-to-main exercise strategy that potentially induces a PAP phenomenon will be eligible. Studies which assessed endurance performance-related outcomes such as time of exercise, time to exhaustion, peak or mean power output etc, having a control condition (no PAP intervention) as a comparator, will be selected.

Information sources: The search will be made in the following databases: Medline-Pubmed; EMBASE; BVS; sportdiscus. Grey literature will be retrieved from Google Scholar; Open grey and studies published in preprint databases (SportRxiv e MedRxiv), and registration protocols (ClinicalTrial.gov e REBEC). In addition, a manual search will be conducted in the reference list of the included studies and eventual contact with the authors will be made in case of relevant missing data.

Main outcome(s): Endurance exercise performance outcomes that have been measured after a PAP strategy (time of exercise, time to exhaustion, peak or mean power output etc) will be included.

Quality assessment / Risk of bias analysis: The risk of bias will be assessed by 2 independent reviewers, having a third reviewer solving cases of divergence. All analysis will be carried out through the ROB 2 software (Cochrane's tool) for risk of bias (Randomization, allocation, blinding of participants, selective reporting, incomplete data, any other potential bias).

Strategy of data synthesis: Qualitative analysis will be performed according to participants' characteristics (age, sample, sex, competitive level), condition (Post activation potentiation or control), study duration, study type, and endurance exercise performance outcomes (time of exercise, time to exhaustion, peak or mean power output etc), with the level of evidence being analyzed by GRADE classification. Quantitative analysis will include the weighted standardized mean difference (SMD) in a random effects

model, having the heterogeneity of the treatment effect being assessed through the I2 statistics and classified from 0 to 50% as low heterogeneity, from 50 to 74% as moderate heterogeneity and from 75% as high heterogeneity. These analyses will be performed in the Review Manager software, version 5.3 (Cochrane Collaboration Copenhagen, The Nordic Cochrane Centre), with a significance level set at 5%.

Subgroup analysis: Post activation potentiation strategies, and endurance modalities.

Sensitivity analysis: It will verify a possible heterogeneity of studies through the I2 statistics, being classified as suggested above. Studies potentially increasing the heterogeneity level will be manually removed until clear indication of influence on results. These analyses will be performed in the Review Manager software, version 5.3 (Cochrane Collaboration Copenhagen, The Nordic Cochrane Centre), with a significance level set at 5%.

Language: There will be no language limits.

Country(ies) involved: Brazil.

Keywords: Performance, physiology, endurance, testing.

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