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INPLASY

Are surface electromyography parameters indicative of post-activation potentiation/post-activation performance enhancement, in terms of twitch potentiation and voluntary performance? A systematic review

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ADMINISTRATIVE INFORMATION

Support - This research received no external funding.

Review Stage at time of this submission - The review is completed (accepted) but not published. At the moment there is a preprint available.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 June 2024 and was last updated on 13 June 2024.

INTRODUCTION

Review question / Objective The aim of this systemic review was to identify if surface electromyography parameters (sEMG) are indicative of post-activation potentiation(PAP)/ post-activation performance enhancement (PAPE), in terms of twitch potentiation and voluntary performance.

Condition being studied We reviewed controlled trials where a conditioning activity protocol (a warm up aimed at inducing PAP/PAPE) was included. Additionally, in all studies sEMG recordings needed to an outcome variable of interest.

METHODS

Search strategy In PubMed, the following search terms were used (in the advanced search): "electromyography"[All Fields] OR "EMG"[All Fields] OR "H-reflex"[All Fields] OR "M-wave*"[All Fields]) AND "post activation p*"[All Fields]. In SCOPUS, the following search terms were used (in the advanced search, with all fields): {electromyography} OR {EMG} OR {H-reflex} OR {M-wave} AND {post activation potentiation}.
In Web of Science, the following search terms were used (in the advanced search): ((((ALL=("electromyography")) OR ALL=("EMG")) OR ALL=("H-reflex")) OR ALL=("M-wave*")) AND ALL= ("postactivation potentiation")
The results were filtered by article/document type in each database (Clinical Trial in PubMed, Article in Web of Science, and Article in SCOPUS, respectively).

Participant or population Healthy human adults (i.e., no recent illness and no injuries).

Intervention We wanted to evaluate interventions where a conditioning activity protocol and sEMG

assessment was included. Additionally, there needed be a clear PAP or PAPE outcome.

Comparator The main interventions were compared to a control (usually standard warm up or no exercise). Its effects on PAP/PAPE outcomes, and sEMG were compared.

Study designs to be included Systematic review of control trials, using the PRISMA statement protocol.

Eligibility criteria The following inclusion criteria were applied: (a) the study was an original research article, and the PAP/PAPE protocols were conducted in healthy human adults (i.e., no recent illness and no injuries), and (b) sEMG recordings were an outcome variable of interest. The exclusion criteria were (a) studies with no explicit PAP/PAPE protocol, and (b) interventional studies with no control group or counterbalance.

Information sources PubMed, SCOPUS and Web of Science was electronic databases.
We contacted some of the authors to clarify and receive further information.

Main outcome(s) sEMG outcomes - the EMG amplitude (i.e., mean absolute value and root mean square), EMG spectral variables (i.e., mean power frequency and median power frequency), H-reflex amplitude, M-wave amplitude and the Hmax/Mmax ratio.
PAP outcomes - Peak Twitch Torque and Twitch rate of Torque Development.
PAPE outcomes - e.g., Peak Power Output, Rate of Force Development, countermovement jump and squat jump performance, respectively.

Quality assessment / Risk of bias analysis The modified physiotherapy evidence database (PEDro) scale was used to evaluate the methodological quality of the included studies in the review.

Strategy of data synthesis Changes in sEMG parameters and twitch/performance outcomes between different CA protocols were examined. The evidence was summarized for conditions were sEMG parameters were indicative of acute improvements in twitch/performance outcomes (PAP and PAPE, respectively) in healthy adults, but also incidents where they were deemed as unrelated.

Subgroup analysis NA.

Sensitivity analysis All the sensitive subject data was kept confidential, by the original authors of the included studies.

Language restriction English.

Country(ies) involved Greece, Sweden.

Keywords post-activation potentiation; electromyography; conditioning activities; post-activation performance enhancement.

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