

INPLASY PROTOCOL

To cite: Guerreiro et al. β -alanine supplementation for athletic performance in female athletes: a protocol for a systematic review of randomized control trials. Inplasy protocol 202260041. doi: 10.37766/inplasy2022.6.0041

Received: 09 June 2022

Published: 09 June 2022

Corresponding author:
Hugo Guerreiro

hugojoaoguerreiro@gmail.com

Author Affiliation:
Instituto Politécnico de Lisboa
- Escola Superior de
Tecnologia de Saúde de
Lisboa.

Support: N/A.

Review Stage at time of this submission: Formal screening of search results.

Conflicts of interest:
None declared.

β -alanine supplementation for athletic performance in female athletes: a protocol for a systematic review of randomized control trials

Guerreiro, H¹; Borrego, R²; Mendes, L³.

Review question / Objective: The Effect of β -alanine Supplementation on Athletic Performance in Female Athletes: a Systematic Review of Randomized Control Trials.

Condition being studied: β -alanine is an endogenously produced non-proteinogenic amino acid that can also be obtained through the consumption of foods such as meat. The ergogenic effect of β -alanine supplementation is linked to the levels of carnosine (a cytoplasmatic dipeptide to which β -alanine is a precursor). It has become one of the most common sports nutrition ergogenic aids, with typical doses at about 4 to 6 g per day that are ideal to elevate muscle carnosine concentrations by up 80%. This elevation happens regardless of high or low baseline levels (common in vegetarians, women and in older subjects) and chronic supplementation (and the associated increase of muscle carnosine levels) is known to be of particular interest in improving high-intensity exercise performance by enhancing intracellular H⁺ buffering, reducing muscle acidosis. It has been mostly proposed as beneficial in exercises between 60 seconds and 4 minutes, but some positive effects have been noted in other sport-related outcomes. The fact that women tend to have less muscle carnosine content than man, in addition to other characteristics of the female athlete, highlights the importance of understanding if the outcomes and magnitude of the effects already found and established in male athletes are, in fact, equivalent in the female athlete.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 June 2022 and was last updated on 09 June 2022 (registration number INPLASY202260041).

INTRODUCTION

Review question / Objective: The Effect of β -alanine Supplementation on Athletic Performance in Female Athletes: a

Systematic Review of Randomized Control Trials.

Condition being studied: β -alanine is an endogenously produced non-proteinogenic amino acid that can also be obtained

through the consumption of foods such as meat. The ergogenic effect of β -alanine supplementation is linked to the levels of carnosine (a cytoplasmatic dipeptide to which β -alanine is a precursor). It has become one of the most common sports nutrition ergogenic aids, with typical doses at about 4 to 6 g per day that are ideal to elevate muscle carnosine concentrations by up to 80%. This elevation happens regardless of high or low baseline levels (common in vegetarians, women and in older subjects) and chronic supplementation (and the associated increase of muscle carnosine levels) is known to be of particular interest in improving high-intensity exercise performance by enhancing intracellular H⁺ buffering, reducing muscle acidosis. It has been mostly proposed as beneficial in exercises between 60 seconds and 4 minutes, but some positive effects have been noted in other sport-related outcomes. The fact that women tend to have less muscle carnosine content than men, in addition to other characteristics of the female athlete, highlights the importance of understanding if the outcomes and magnitude of the effects already found and established in male athletes are, in fact, equivalent in the female athlete.

METHODS

Search strategy: A search strategy was developed using appropriate terms derived from the review question. The terms ‘femal*’, ‘woman’, ‘female athlete*’, ‘sport*’, ‘athletic’, ‘athletic performance’, ‘performance’, ‘sports performance’, ‘beta alanine’ and ‘beta alanine supplement*’ were searched in all fields and the boolean operators ‘AND’ and ‘OR’ were applied. The electronic search was conducted for all studies investigating the effects of β -alanine on athletic performance via PUBMED, WEB OF SCIENCE and EBSCO. Bibliographic database searches were conducted on the 28th of March 2022 and, to the total documents found on the bibliographic databases, additional predetermined filters were applied (when possible): only Randomized Control Trials

(RCTs) have been included, ages of the participants must be 19 and over, and publication date was restricted to January of 2000 until the present date. If a filter was not available in the database search engine, the documents' title and abstract were screened individually to guarantee that they met the inclusion criteria.

Participant or population: This systematic review will address female athletes enrolled in Randomized Control Trials with protocolized β -alanine supplementation, that are aged 19 and over, and with no exclusions based on ethnicity, country of origin, sport, or level of competition. Studies which evaluated both sexes and/or other age gaps were included but the only the adequate data was extracted for analysis. This population was chosen because of the chronic lack of scientific evidence being developed over the years with female athletes. Only recently have researchers, athletes and other professionals associated with sports (like dietitians or coaches) have become more aware of the differences between male and female athletes and have learned that, most of the times, scientific evidence can't be inferred between them.

Intervention: N/A.

Comparator: N/A.

Study designs to be included: This systematic review will only include randomized control trials (RCTs) since the reliability and validity of their results are the most robust.

Eligibility criteria: Population: We included randomized controlled trials of adult (age > 18 years) female athletes with no exclusions based on ethnicity, country of origin, sport, or level of competition. Studies which evaluated both sexes and/or other age gaps were included but the only the adequate data was extracted for analysis. Intervention: We considered all randomized controlled trials where β -alanine supplementation was protocolized. Outcomes: To be included, a trial had to use a defined outcome related

with athletic performance Only studies written in English and published after January of 2000 were included.

Information sources: An electronic search was conducted for all studies investigating the effects of β -alanine on athletic performance via PUBMED, WEB OF SCIENCE and EBSCO.

Main outcome(s): Beta-alanine has been studied in a variety of situations. Apart from seeming to act as an antioxidant, beta-alanine supplementation generally enhances high intensity exercise lasting over 60 seconds and has a significant effect on time to exhaustion tasks. It may also improve exercise duration on tasks requiring greater contribution of aerobic energy pathways (such as 2k rowing time-trial and other exercises with >4min in duration). Improvements in neuromuscular fatigue indicators like 'electromyographic fatigue threshold' and 'physical working capacity at fatigue threshold' are also seen with subjects (particularly older ones) supplementing with beta-alanine which seems to also increase training volume. Finally, beta-alanine supplementation has also demonstrated positive effects on military-specific tasks like peak power, marksmanship, cognitive function, and performance.

Quality assessment / Risk of bias analysis: For evaluating the risk of bias, inconsistency, publication bias and imprecision the GRADE system was used since it is considered the standard for rating the quality of evidence in systematic reviews.

Strategy of data synthesis: A data extraction sheet (from Cochrane Consumers and Communication Review Group's data extraction template) was adapted to this review's study inclusion requirements. One author extracted the data, and another verified it.

Subgroup analysis: N/A.

Sensitivity analysis: N/A.

Language: English.

Country(ies) involved: Portugal.

Keywords: β -alanine; supplementation; female athlete; athletic performance; nutrition; sports nutrition.

Contributions of each author:

Author 1 - Hugo Guerreiro.

Email: hugojaoguerreiro@gmail.com

Author 2 - Rute Borrego.

Email: rute.borrego@estesl.ipl.pt

Author 3 - Lino Mendes.

Email: lino.mendes@estesl.ipl.pt