INPLASY PROTOCOL

To cite: Deng et al. Effects of Combined Upper and Lower Limb Plyometric Training Interventions on Physical Fitness in Athletes: A Systematic Review with Meta-Analysis. Inplasy protocol 202290059. doi: 10.37766/inplasy2022.9.0059

Received: 14 September 2022

Published: 14 September 2022

Corresponding author:
Nuannuan Deng

gs61303@student.upm.edu.my

Author Affiliation:
Universiti Putra Malaysia.

Support: **None.**

Review Stage at time of this submission: **Formal screening of search results against eligibility criteria.**

Conflicts of interest:
None declared.

Effects of Combined Upper and Lower Limb Plyometric Training Interventions on Physical Fitness in Athletes: A Systematic Review with Meta-Analysis

Deng, NN[1]; Soh, KG[2]; Abdullah, B[3]; Huang, DD[4].

Review question / Objective: **What are the effects of combined upper and lower limb plyometric training on athletes' physical fitness?**
Eligibility criteria: **Only full-text, peer-reviewed, original studies written in English were considered,excluding cross-sectional, review papers, or training-related studies that did not focus on the effects of PT exercises). Retrospective studies, prospective studies, studies for which only the abstract was available, case reports, special communications, letters to the editor, invited commentaries, errata, overtraining studies,patent were excluded.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 September 2022 and was last updated on 14 September 2022 (registration number INPLASY202290059).

INTRODUCTION

Review question / Objective: **What are the effects of combined upper and lower limb plyometric training on athletes' physical fitness?**

Condition being studied: **Physical fitness is the most important component in enhancing athletic ability, and developing excellent sports performance is the primary goal of sports training in competitive sports. It is commonly recognized that strength training can help athletes strengthen their physical fitness. In many types of strength training, plyometric training is an effective option for athletes to improve physical performance.**

METHODS

Search strategy: Four electronic databases were searched on August 13, 2022: Web of sciences, SPORTDiscus, PubMed, and SCOPUS. We employed the following Boolean search syntax: "plyometric training" OR "plyometric exercise*" OR "stretch-shortening cycle" OR "stretch-shortening exercise*" AND "player*" OR "athlete*" OR "sportsman*" OR "sportswoman*" OR "sportsperson*".

Participant or population: Athletes, with no restrictions on their fitness level, sex, or age.

Intervention: Combined upper and lower limb plyometric training.

Comparator: Active control group.

Study designs to be included: Randomized Controlled Trials.

Eligibility criteria: Only full-text, peer-reviewed, original studies written in English were considered, excluding cross-sectional, review papers, or training-related studies that did not focus on the effects of PT exercises). Retrospective studies, prospective studies, studies for which only the abstract was available, case reports, special communications, letters to the editor, invited commentaries, errata, overtraining studies, patent were excluded.

Information sources: Four electronic databases i.e., Web of sciences, SPORTDiscus, PubMed, and Scopus were searched. In order to find additional eligible studies for inclusion in this study, google scholar and the reference lists of the selected papers were examined.

Main outcome(s): At least one measure related to physical fitness (e.g. jump height, sprint, muscle strength) before and after the training intervention

Quality assessment / Risk of bias analysis: The Physiotherapy Evidence Database (PEDro) scale was used to assess the methodological quality of the included studies. This scale evaluates different aspects of the study design, such as participant eligibility criteria, randomization, blinding, attrition, and reporting of data. There are 11 items included in the PEDro checklist, but the first item is not rated. Therefore, the minimum possible score on the checklist is 0 and the maximum 10. The quality assessment was interpreted as follows: ≤3 points was considered poor quality, 4–5 points as moderate quality, and 6–10 points as high quality.

Strategy of data synthesis: If three or more substantially homogenous studies supplied baseline and follow-up data for the same parameter, meta-analyses were conducted. Between-group effect sizes (ES; Hedge's g) were calculated using pre- and post-intervention performance means and standard deviations (SD). Post score SD was used to standardize the data. The inverse-variance random-effects model for meta-analyses was used because it allocates a proportionate weight to trials based on the size of their individual standard errors and facilitates analysis while accounting for heterogeneity across studies. This approach was used to better account for the inaccuracy in the estimate of between-study variance. The effect size (ES) are displayed alongside 95% confidence intervals (CIs), and were interpreted as follows: 0.6–1.2, moderate; >1.2–2.0, large; >2.0–4.0, very large; >4.0, extremely large. In some trails in which there was more than one intervention group, the control group was proportionately divided to facilitate comparison across all participants (Higgins et al., 2008). All analysis was carried out in the Comprehensive Meta-Analysis (version 3; Biostat,Englewood, NJ, USA).

Subgroup analysis: The moderator factors of program duration, and the total number of training sessions were included. The participant's gender and age were also considered as moderator variables. Participants were divided using a median split. Meta-analyses stratification by each of these factors was performed, with a $p <$

0.05 considered as the threshold for statistical significance.

Sensitivity analysis: A sensitivity analysis was undertaken when Egger's test was significant (p< 0.05), and results were analyzed with each study deleted from the model once.

Language restriction: Only articles published in English were considered.

Country(ies) involved: China; Malaysia.

Keywords: plyometric training; jump; sprint; strength; flexibility

Contributions of each author:

Author 1 - Nuannuan Deng.
Email: gs61303@student.upm.edu.my
Author 2 - Kim Geok Soh.
Email: kims@upm.edu.my
Author 3 - Borhannudin Abdullah.
Author 4 - Dandan Huang.