

Effectiveness of Core Muscle Training on Throwing Ball Velocity: Research Protocol of a Systematic Review and Meta-analysis

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ADMINISTRATIVE INFORMATION**Support** - TSUM.**Review Stage at time of this submission** - Preliminary searches.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202380018

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 03 August 2023 and was last updated on 03 August 2023.

INTRODUCTION

Review question / Objective To investigate the treatment effect of core muscle training (CMT) on throwing ball-velocity in the overhead athlete population.

Rationale Core muscles play a pivotal role in stabilizing the pelvis, controlling upper torso movements, and facilitating the seamless transfer of momentum between the upper and lower extremities. Multiple studies have exhibited promising outcomes, showcasing the positive impact of CMT on improving ball-throwing velocity in overhead athletes. Building upon this foundation, our study aims to undertake a specific meta-analysis focused on this subject matter.

Condition being studied The PICO (population, intervention, comparison, outcome) setting of the current meta-analysis included: (1) P: human participants; (2) I: core muscle training; (3) C: other treatment; and (4) O: changes in throwing ball-velocity.

METHODS

Search strategy Two authors made independent electronic searches in the PubMed, Cochrane library, and ClinicalTrials.gov with keywords of ("core muscle training" OR "core stability training" OR "trunk muscle training" OR "core strength exercises" OR "lumbopelvic control training") AND ("throwing ball-velocity" OR "overhead athlete").

Participant or population Overhead athletes.

Intervention Core muscle training.

Comparator Controlled management.

Study designs to be included Randomized controlled trials.

Eligibility criteria (1) clinical trials investigating throwing ball-velocity before and after CMT; (2) inclusion of adult and adolescent professional or amateur athletes participating in throwing-related sports such as baseball, softball, and handball.; (3)

the intervention groups receiving either CMT alone or CMT in combination with other interventions and (4) one reference group undergoing treatments that did not include CMT.

Information sources Two authors made independent electronic searches in the PubMed, Cochrane library, PEDro and ClinicalTrials.gov with keyword of ("core muscle training" OR "core stability training" OR "trunk muscle training" OR "core strength exercises" OR "lumbopelvic control training") AND ("throwing ball-velocity" OR "overhead athlete").

Main outcome(s) The outcome measurements were the changes in the stand throwing ball-velocity, step throwing ball-velocity and jump throwing velocity following CMT or control regimens.

Data management Two independent authors extracted data from the recruited studies, encompassing demographic data, study design, details of CMT and control regimens, and values of the outcomes. The evaluators paid special attention to the effect direction of the scale used in each trial to avoid mis-interpretation.

Quality assessment / Risk of bias analysis To ensure a robust evaluation of the RCTs included in the research, the PEDro score was utilized as a reliable metric. Comprising 11 essential criteria, PEDro meticulously examines study quality, including eligibility criteria, random allocation, allocation concealment, baseline similarity, blinding of subjects, blinding of therapists, blinding of assessors, outcome measures, intention-to-treat analysis, between-group comparison, and point/variability measures. This comprehensive assessment helps ascertain the overall rigor and validity of the studies under scrutiny.

Strategy of data synthesis We applied a random-effects model in Comprehensive Meta-Analysis software to combine the effect sizes. Statistical significance was defined as a two-tailed p-value of less than 0.05. To quantify the study outcomes, we utilized Hedges' g, where values of 0.2, 0.5, and 0.8 were considered indicative of small, moderate, and large effect sizes, respectively.

Subgroup analysis Subgroup analyses based on the CMT regimens, age of adolescent and training type were performed.

Sensitivity analysis To confirm the robustness of the meta-analysis, the sensitivity analyses were performed using one-study removal method to see

if there was a significant change in the summary effect size after removing a particular trial from the analysis.

Language restriction No limitation of languages.

Country(ies) involved Taiwan.

Keywords Core stability, sport medicine, physical therapy, athletic performance.

Contributions of each author

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