INPLASY PROTOCOL

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No conflicts of interest.

Effects of high-intensity interval training in men soccer player's physical fitness: A systematic review with meta-analysis of randomized-controlled and non-controlled trials

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Review question / Objective: **The purpose of this SRMA was to assess the effects of HIIT-based intervention on VO2max, APMFBT, RSA, CMJ, and ST on men soccer players from different ages.**
Condition being studied: **Analyze the effects of isolated running-based HIIT interventions with no restrictions for the duration (e.g., short-intervals, long-intervals, small-sided games, speed endurance training, repeated sprint training, and sprint interval training) on maximal oxygen uptake, aerobic capacity measured at field-based tests, repeated sprint ability, vertical height jump and sprint time at men soccer players from different ages.**
Information sources: **A comprehensive computerized search of the following electronic databases was executed: (i) Web of Science; (ii) Scopus; (iii) SPORTdiscus; and (iv) PubMed. Only original studies and full-articles will be included.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 01 June 2020 and was last updated on 01 June 2020 (registration number INPLASY202060006).

INTRODUCTION

Review question / Objective: **The purpose of this SRMA was to assess the effects of HIIT-based intervention on VO2max, APMFBT, RSA, CMJ, and ST on men soccer players from different ages.**

Rationale: **There are, as far as we know, no systematic review and meta-analysis (SRMA) dedicated to analyzing the effects of different HIIT formats on key-physical qualities of soccer players. Based on that, it could be important to summarize the evidence about the effects of different HIIT interventions on soccer players from different ages and competitive levels.**

Condition being studied: Analyze the effects of isolated running-based HIIT interventions with no restrictions for the duration (e.g., short-intervals, long-intervals, small-sided games, speed endurance training, repeated sprint training, and sprint interval training) on maximal oxygen uptake, aerobic capacity measured at field-based tests, repeated sprint ability, vertical height jump and sprint time at men soccer players from different ages.

METHODS

Search strategy: A comprehensive computerized search of the following electronic databases was executed: (i) Web of Science; (ii) Scopus; (iii) SPORTdiscus; and (iv) PubMed. The search for relevant publications had no restriction to a year of publication and included articles until 16th May 2020. The following search strings were employed: "soccer" OR "football AND "high-intensity interval training" OR "HIIT" OR "high-intensity intermittent training" OR "interval training" OR "small-sided games" OR "sprint interval training" OR "repeated sprint training" OR "speed endurance training".

Participant or population: Men soccer players from any age-group.

Intervention: Isolated running-based HIIT interventions with no restrictions for the duration (e.g., short-intervals, long-intervals, small-sided games, speed endurance training, repeated sprint training, and sprint interval training).

Comparator: Control groups or other training methods.

Study designs to be included: Randomized controlled and non-controlled trials.

Eligibility criteria: The a priori inclusion criteria for this review were as follows: (i) only randomized-controlled or non-controlled trial conducted in men soccer players with no restriction to age or competitive level; (ii) isolated running-based HIIT interventions with no restrictions for duration (e.g., short-intervals, long-intervals, small-sided games, speed endurance training, repeated sprint training and sprint interval training); (iii) a pre-post outcomes including VO2max, aerobic capacity at field-based incremental tests, VJH, RSA or ST; (iv) articles written in English; (v) only full-text and original articles.

Information sources: A comprehensive computerized search of the following electronic databases was executed: (i) Web of Science; (ii) Scopus; (iii) SPORTdiscus; and (iv) PubMed. Only original studies and full-articles will be included.

Main outcome(s): The outcomes chosen for this SRMA included VO2max, aerobic capacity at field-based tests, repeated sprint ability, Vertical height Jump and Sprint time. Both, direct determination (by gas analyzer in a graded exercise test in which intensity is progressively increased until exhaustion) and indirect determination (e.g., estimation based on valid equations applied to field-based tests) were considered to measure the VO2max (e.g., maximal oxygen uptake; peak oxygen uptake) expressed as ml/kg/min-1. The APMFBT included progressive tests until exhaustion (e.g., multistage tests) or time-based tests (e.g., maximum distance covered at a given predefined time) in which the measures of total distance covered (m), maximal velocity achieved (km/h-1) or maximal aerobic speed (m/s-1) were collected. The VHJ (measured in cm) was usually measured as CMJ with or without arm swing. The RSA was collected based on the mean time (s) or total time (s) in a series of multiple sprints. The linear ST (s) at different distances was also collected, not including values of partial times.

Quality assessment / Risk of bias analysis: The Physiotherapy Evidence Database (PEDro) scale was used to assess the methodological quality of the randomized-controlled and non-controlled trial included in this SRMA. The scale scores the internal study validity in a range of 0 (high risk of bias) to 10 (low risk of bias). Eleven items

are measured in the scale. The criterion 1 is not included in the final score. Points for items 2 to 11 were only attributed when a criterion was clearly satisfied. Two of the authors independently scored the included articles. Disagreements in the rating between both authors was resolved through discussion. Aiming to control the risk of bias between authors, the Kappa correlation test was used to analyze the agreement level for the twenty-six included studies.

Strategy of data synthesis: The following information was extracted from the included studies: (i) number of participants (n), age (years), competitive level (if available) and design of study (randomized-controlled trial or non-controlled trial); (ii) HIIT format (e.g., siHIIT [work duration 2 min]; SSGs [drill-based exercise with intermittent regimen]; RST [work duration <20 s with 20 s with >2 min recovery between repetitions]) following the classification of a previous study (Buchheit & Laursen, 2013a); (iii) period of intervention (number of weeks) and number of sessions per week (n/w); (iv) regimen of intervention (work duration, work intensity, modality, relief duration, relief intensity, repetitions and series, between-set recovery). The outcomes will be extracted as mean, standard-deviation and sample size in pre and post intervention.

Subgroup analysis: Subgroup analysis will include comparisons between HIIT formats and between HIIT interventions vs. control.

Sensibility analysis: The extended Egger's test will be used to assess the risk of bias across the studies. With the purpose of reducing the risk of heterogeneity, a sensitivity analyses could be executed aiming to determine the robustness of the summary estimates.

Language: English only.

Country(ies) involved: Portugal, Chile and Brazil.

Keywords: football; athletic performance; interval training; sprint interval training.

Contributions of each author:

Author 1 - Filipe Manuel Clemente - Conceived the SRMA; Defined the PICOT; Made the search; Executed the studies eligibility; Drafted the manuscript.

Author 2 - Rodrigo Ramirez-Campillo - Conceived the SRMA; Made the statistical analysis; Drafted the manuscript.

Author 3 - Fábio Yuzo Nakamura - Drafted the manuscript.

Author 4 - Hugo Sarmento - Conceived the SRMA; Defined the PICOT; Made the search; Executed the studies eligibility; Drafted the manuscript.