

INPLASY PROTOCOL

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Review Stage at time of this submission: Piloting of the study selection process.

Conflicts of interest:
None declared.

Unilateral versus bilateral landing after spike jumps in male and female volleyball: A systematic review of official matches, simulated 6 vs. 6 games and laboratory or analytical conditions

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Review question / Objective: Our goal was to systematically review studies assessing how male and female volleyball players land (i.e., unilaterally, or bilaterally) after spike jumps in official matches or simulated 6 vs. 6 games, as well as in laboratory and/or analytical settings. The working hypothesis is that unilateral landings predominate, especially in match conditions and especially in men. However, based on a preliminary overview of the literature, data is scarce to generate hypothesis concerning injury risk.

Condition being studied: Exposure to landing after spike actions during official matches AND/OR simulated 6 vs. 6 games AND/OR analytical training conditions AND/OR laboratorial experiments.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 April 2021 and was last updated on 21 April 2021 (registration number INPLASY202140104).

INTRODUCTION

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METHODS

Search strategy: Code lines used in Cochrane Library, PubMed, Scopus, SPORTDiscus and Web of Science: ["volleyball" (title/abstract)] AND ["spik*" OR "attack*" OR "smash*" OR "hit" OR "hitting" (all fields)] AND ["land*" (all fields)]. Code lines used in Scielo and EBSCO: ["volleyball" (all fields)] AND ["spik*" OR "attack*" OR "smash*" OR "hit" OR "hitting" (all fields)] AND ["land*" (all fields)]. Search results were exported to EndNote 20.0.1 for Mac (Clarivate Analytics). No filters or limits were applied.

Participant or population: Healthy indoor volleyball players of any sex, age group or competitive level.

Intervention: Exposure to landing after spike actions during official matches AND/OR simulated 6 vs. 6 games AND/OR analytical training conditions AND/OR laboratorial experiments.

Comparator: Not required.

Study designs to be included: No restrictions imposed on study design.

Eligibility criteria: Inclusion: Healthy indoor volleyball players of any sex, age group or competitive level; Exposure to landing after spike actions during official matches AND/OR simulated 6 vs. 6 games AND/OR analytical training conditions AND/OR laboratorial experiments; Not required; Data on landing biomechanics patterns after spike actions, including reporting of whether the landing was unilateral or bilateral. If available, data on the degree of

asymmetry in joints degree of flexion and reaction forces upon landing; No restrictions imposed on study design. Exclusion criteria: Practitioners of sports other than indoor volleyball (i.e., sitting volleyball, beach volleyball), unhealthy or injured indoor volleyball players, or physical education students; No exposure to landing after spike actions; No study will be excluded on the basis of comparators; Absence of data characterizing landing after spike actions as being unilateral or bilateral; No study will be excluded on the basis of study design.

Information sources: Searches were performed in seven electronic databases (Cochrane Library, EBSCO, PubMed, Scielo, Scopus, SPORTDiscus and Web of Science) in 2021, after protocol registration. Following selection of articles to be included, a manual search was conducted in their reference lists to retrieve additional studies that could fit our eligibility criteria. Then, the list of included articles and the inclusion criteria were sent to two independent experts to help identify additional relevant articles. The experts had to fulfill three criteria: (i) hold a Ph.D. in Sports Sciences; (ii) be university professors; (iii) have peer-reviewed publications in volleyball in journals with impact factor according to the Journal Citation Reports®. The experts were not provided with our search strategy, to avoid biasing their own searches. Upon completion of all these steps, in 2021, the databases were again consulted in search for errata or retractions of any included study.

Main outcome(s): Data on landing biomechanics patterns after spike actions, including reporting of whether the landing was unilateral or bilateral. If available, data on the degree of asymmetry in joints degree of flexion and reaction forces upon landing.

Quality assessment / Risk of bias analysis: Upon inspection of the literature, the authors felt that no scale for assessment of methodological quality and risk of bias was appropriated for our review purposes,

especially considering the possibility that many retrieved studies would use an observational design. Therefore, for observational studies, risk of bias will not be assessed, but their intra- and inter-observer reliability will be assessed. For non-randomized studies, ROBINS-I will be used, while for randomized studies RoB 2 will be applied. JA and FMC independently assessed risk of bias for all studies. In case of disagreements, AP, RFL and RRC intervened to provide a final decision.

Author 7 - Gustavo Costa.
Author 8 - Antonio Alcaraz.
Author 9 - Rui Araújo.
Author 10 - Luca Paolo Ardigò.
Author 11 - Filipe Manuel Clemente.

Strategy of data synthesis: No meta-analysis is planned. A narrative synthesis of the results will be provided. Studies will be analysed separately according to their study design. For example, randomized laboratorial trials will analysed separately from observational match analysis studies. Planned subgroup narrative synthesis, if sufficient data is available: (i) male versus female; (ii) age groups versus adults; (iii) higher versus lower competitive levels; (iv) player position/positional status (e.g., setter, middle-blocker); and (v) match (official or simulated) versus controlled conditions (laboratory or analytical). Planned moderated narrative synthesis: (i) attack zone; (ii) attack tempo; (iii) straight run-up versus feints; (iv) type of action preceding the attack; and (v) left-handed versus right-handed spikers.

Subgroup analysis: Not planned.

Sensitivity analysis: Not planned.

Language: English.

Country(ies) involved: Portugal, Brazil, Spain, Chile, Italy.

Keywords: volleyball, landing, unilateral, biomechanics, injury risk, match analysis, strength-shortening-cycle, symmetry.

Contributions of each author:

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Author 2 - Rodrigo Ramirez Campillo.
Author 3 - Ricardo Lima.
Author 4 - Lorenzo Laporta.
Author 5 - Ana Paulo.
Author 6 - Henrique Castro.