International Platform of Registered Systematic Review and Meta-analysis Protocols

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Mechanisms, Injury Patterns, and Biomechanical Factors of Anterior Cruciate Ligament Injuries in Basketball: A Systematic Review and Meta-Analysis of Video-Analysis Studies

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Ye, Z.

Corresponding author:
Zhiyan Ye

yezhiyan999@gmail.com

Author Affiliation:
Independent Researcher.

ADMINISTRATIVE INFORMATION

Support - No funding.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 7 July 2026 and was last updated on 7 July 2026.

INTRODUCTION

Review question / Objective This systematic review aims to identify and synthesize evidence on injury mechanisms, injury patterns, and biomechanical factors associated with anterior cruciate ligament (ACL) injuries in basketball players using video analysis studies.

Rationale Anterior cruciate ligament (ACL) injuries are among the most serious and common injuries in basketball, often leading to long-term functional limitations and high medical burden. Video analysis provides a unique opportunity to investigate real-game injury mechanisms in ecologically valid conditions. However, existing studies are fragmented and lack a comprehensive synthesis of injury mechanisms and biomechanical factors. Therefore, this systematic review aims to summarize and critically evaluate available video-analysis studies to improve understanding of ACL injury mechanisms in basketball.

Condition being studied Anterior cruciate ligament (ACL) injury in basketball players, focusing on injury mechanisms and biomechanical risk factors identified through video analysis.

METHODS

Search strategy A systematic search will be conducted in PubMed, Web of Science, Scopus, and SPORTDiscus databases. The search strategy will combine keywords and MeSH terms related to "anterior cruciate ligament injury", "ACL injury", "basketball", "video analysis", and "biomechanics". Boolean operators (AND/OR) will be used to combine search terms. Reference lists of included studies will also be screened for additional relevant studies.

Participant or population Basketball players of any age, sex, or competitive level who sustained anterior cruciate ligament (ACL) injuries identified through video analysis of real-game situations.

Intervention Not applicable. This review focuses on observational video-analysis studies of ACL injury events in basketball.

Comparator Not applicable. This systematic review focuses on observational video-analysis studies of ACL injuries in basketball and does not involve a comparator intervention.

Study designs to be included Observational studies including retrospective video-analysis studies, case series, and biomechanical observational studies analyzing ACL injury events in basketball.

Eligibility criteria Inclusion criteria:

(1) Studies involving basketball players with ACL injuries confirmed or inferred through video analysis; (2) Studies analyzing injury mechanisms, movement patterns, or biomechanical factors; (3) Original research articles; (4) Published in peer-reviewed journals.

Exclusion criteria:

(1) Studies without video-based analysis; (2) Reviews, editorials, or conference abstracts without full data; (3) Studies not focused on basketball or ACL injury; (4) Non-English publications (if language restriction applied).

Information sources Electronic databases will include PubMed, Web of Science, Scopus,Cochrance,Embase and SPORTDiscus. Additionally, reference lists of included studies will be screened manually to identify further relevant articles. No restrictions will be applied regarding publication year.

Main outcome(s) The main outcomes include injury mechanisms of ACL injuries in basketball, including movement patterns (e.g., landing, cutting, deceleration), joint positions at injury, and biomechanical risk factors identified through video analysis.

Additional outcome(s) Additional outcomes include contextual factors such as game situation, player position, and defensive pressure at the time of injury.

Data management Additional outcomes include situational factors (e.g., player-to-player contact, game context), player characteristics (e.g., sex, competition level), and environmental factors associated with ACL injury events.

Quality assessment / Risk of bias analysis The methodological quality and risk of bias of included studies will be assessed using appropriate tools for observational studies, such as the Newcastle-Ottawa Scale (NOS) or modified biomechanical study appraisal tools. Two reviewers will independently assess study quality, and disagreements will be resolved by consensus.

Strategy of data synthesis A narrative synthesis will be conducted to summarize findings across included studies. If sufficient homogeneous data are available, a meta-analysis will be performed using a random-effects model. Results will be presented according to injury mechanisms, biomechanical factors, and situational characteristics.

Subgroup analysis Subgroup analyses will be conducted based on sex (male vs female), competition level (professional vs amateur), and injury mechanism type (contact vs non-contact).

Sensitivity analysis Sensitivity analyses will be performed by excluding studies with high risk of bias to assess the robustness of the findings.

Language restriction English only.

Country(ies) involved China.

Other relevant information This protocol follows PRISMA-P guidelines for systematic review protocols.

Keywords ACL injury; basketball; video analysis; biomechanics; injury mechanism; landing; cutting; systematic review; sports injury.

Dissemination plans Results will be submitted for publication in a peer-reviewed sports medicine or biomechanics journal and may be presented at academic conferences.

Contributions of each author

Author 1 - Zhiyan Ye - The author conceived the study, designed the methodology, and will conduct literature screening, data extraction, and manuscript preparation.
Email: yezhiyan999@gmail.com