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Topical Analgesic Therapies for Acute, Sports-Associated Soft Tissue Injuries: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION**Support** - N/A.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202670096**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 24 July 2026 and was last updated on 24 July 2026.**INTRODUCTION**

Review question / Objective Given the ambiguity of their recommended use in practice, and the differences between drug products and topical formulations, the objective of this systematic review and meta-analysis was to determine the efficacy and safety of topical analgesic therapies for acute, sports-associated soft tissue injuries.

Condition being studied Analgesia in sports medicine.

METHODS

Participant or population Adult patients with sports-associated injuries.

Intervention Topical analgesics with active pharmaceutical ingredients.

Comparator Placebo or standard of care (i.e., ice, elevation).

Study designs to be included Randomized controlled trials.

Eligibility criteria Randomized controlled trials that provided complete efficacy and safety outcomes of topical analgesics in sports or exercise-induced soft tissue injuries in adult patients were eligible for inclusion. Non-randomized trials, those utilizing combination therapies of multiple pharmaceutical agents concomitantly, those assessing other types of injuries in athletes not specifically identified as a soft tissue injury, and those not available or readily translatable to English were excluded.

Information sources A systematic review and meta-analysis was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive search strategy to identify reports of topical analgesia used to treat sports-related injuries was constructed in Embase (Embase.com, Elsevier) by an experienced health sciences

librarian using truncated keywords, phrases, and subject headings and subheadings. Searches for common sports injuries, specific sports, and general terms relating to sport medicine were combined with terms for analgesics as a drug classification, specific analgesics, and analgesia in general, and then further limited to topical or transdermal administration or dosage forms. This strategy was translated to MEDLINE (OVID platform), Cochrane Central Register of Controlled Trials (CochraneLibrary.com, Wiley), the Web of Science Core Collection (Web of Science platform, Clarivate), CINAHL and SPORTDiscus (EBSCO Research Database platform) with all searches performed on 30 May 2025.

Main outcome(s) Meta-analysis of all included trials revealed no significant reduction in pain intensity in active topical interventions versus placebo (95% CI -0.3768 – 5.2806; $p = 0.09$).

Additional outcome(s) Adverse effects were primarily mild and localized, and were no different between groups (RR = 0.79; 95% CI 0.45 – 1.39; $p=0.41$).

Quality assessment / Risk of bias analysis Bias was assessed using the Risk of Bias Assessment tool as provided by Cochrane RoB-2.

Strategy of data synthesis Priority for data extraction was given towards those studies that clearly documented patient outcomes related to improved pain symptoms and reductions in pain scores. Two authors were responsible for screening and deciding upon inclusion or exclusion of studies with any unresolved discrepancies being forwarded to the third author for adjudication. Automation was utilized to remove duplicate entries in Lean Library Workspace and confirmed for accuracy by the authors. Data extraction from included studies was completed by two authors independently, and then reviewed collectively for precision.

Subgroup analysis A direct comparative analysis of diclofenac versus other NSAIDs did not demonstrate a statistically significant difference (effect size -2.07; 95% CI -5.60–1.46; $p = 0.25$).

Sensitivity analysis Not applicable.

Country(ies) involved United States of America.

Keywords Sports medicine; analgesia; anti-inflammatory.

Contributions of each author

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Author 3 - Justin Reinert.