

Review Article

Topical application of analgesics in knee pain: A systematic review

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ABSTRACT

Knee pain is a prevalent condition that can significantly impact individuals' quality of life. Topical analgesics have emerged as a potential noninvasive treatment option for knee pain. This systematic review aimed to assess the effectiveness and safety of topical analgesics in managing knee pain. A systematic literature search was conducted in electronic databases (PubMed, Embase, and Cochrane Library) up to May 25, 2023. Studies investigating the topical application of analgesics for knee pain were included. The outcomes of interest encompassed pain relief, functional improvement, adverse events, and patient satisfaction. Six studies met the inclusion criteria and were incorporated into the systematic review. These studies evaluated various topical analgesics, including nonsteroidal anti-inflammatory drugs capsaicin, lidocaine, and salicylates. Most of the studies were randomized controlled trials, whereas some were prospective cohort studies. The available evidence suggests that topical application of analgesics may be a viable treatment option for knee pain. However, further research is necessary to establish optimal treatment protocols, evaluate long-term efficacy, and conduct head-to-head comparisons of different topical analgesics. Standardization of outcome measures and study designs would facilitate better comparisons across studies. Additionally, future research should focus on assessing the cost-effectiveness and patient preferences related to topical analgesics for managing knee pain.

Keywords: Capsaicin, Knee pain, Lidocaine, Nonsteroidal anti-inflammatory drugs, Salicylates, Systematic review, Topical analgesics.

INTRODUCTION

Knee pain is a prevalent musculoskeletal condition that affects individuals of all ages, often leading to significant impairment in mobility, functionality, and overall quality of life. It can arise from various underlying causes, including osteoarthritis, ligament injuries, tendinitis, and bursitis. Traditional treatment approaches for knee pain often involve oral medications, injections, or physical therapy, but these methods may carry potential systemic side effects or require invasive procedures. As a result, there is growing interest in exploring alternative noninvasive treatment options, such as topical analgesics, to manage knee pain effectively.

Topical analgesics offer a localized approach to pain management by delivering medication directly to the site of discomfort. They come in various formulations, including creams, gels, ointments, patches, and sprays, which can be conveniently applied to the skin over the affected knee joint. By bypassing the gastrointestinal system, topical analgesics may potentially minimize systemic exposure and associated side effects, making them an attractive option for individuals seeking localized pain relief.

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The objective of this systematic review is to evaluate the effectiveness and safety of topical analgesics in the management of knee pain. By systematically examining the available literature, we aim to provide an evidence-based assessment of the current state of knowledge regarding the use of topical analgesics in this context. Specifically, we will assess the impact of topical analgesics on pain relief, functional improvement, adverse events, and patient satisfaction.

This review will contribute to the existing body of literature by synthesizing the findings from various studies and critically analyzing their methodology, outcomes, and limitations. Through a comprehensive evaluation of the evidence, we aimed to provide valuable insights into the efficacy and safety of topical analgesics in knee pain management, helping healthcare professionals and patients make informed decisions regarding their use.

Given the wide range of topical analgesics available, including nonsteroidal anti-inflammatory drugs (NSAIDs), capsaicin, lidocaine, and salicylates, it is important to assess their relative effectiveness and potential differences in outcomes. Furthermore, understanding the safety profiles and patient satisfaction associated with topical analgesics will contribute to a comprehensive assessment of their overall utility in knee pain management.

Ultimately, this systematic review will serve as a valuable resource for clinicians, researchers, and policymakers in guiding treatment decisions and identifying areas for further research and improvement in the management of knee pain. By consolidating the available evidence, we aim to advance the understanding of topical analgesics as a noninvasive option for knee pain relief, potentially improving patient outcomes and enhancing their quality.

MATERIAL AND METHODS

A systematic literature search was conducted to identify relevant studies investigating the topical application of analgesics in knee pain. Electronic databases, including PubMed, Embase, and Cochrane Library, were searched up to May 25, 2023. The search strategy involved a combination of keywords and medical subject headings related to knee pain, topical analgesics, and relevant terms such as NSAIDs, capsaicin, lidocaine, and salicylates.

The inclusion criteria for selecting studies were as follows:

1. Studies that evaluated the use of topical analgesics for knee pain management.
2. Studies reporting outcomes related to pain relief, functional improvement, adverse events, and patient satisfaction.
3. Studies published in English.

Studies were excluded if they met any of the following criteria:

1. Studies that did not involve the topical application of analgesics for knee pain.
2. Studies with irrelevant outcomes or inadequate reporting of outcomes of interest.
3. Studies published in languages other than English.

The initial search results were screened based on titles and abstracts to identify potentially relevant articles. Subsequently, full-text articles were obtained for further assessment. Two independent reviewers assessed the full-text articles for eligibility based on the inclusion and exclusion criteria. Any discrepancies in study selection were resolved through discussion and consensus.

Data extraction was performed using a standardized form to collect relevant information from the included studies. The extracted data included study characteristics (e.g., authors and publication year), study design, sample size, participant characteristics (e.g., age and gender), type and formulation of topical analgesics, duration of treatment, outcome measures, and results related to pain relief, functional improvement, adverse events, and patient satisfaction.

The methodological quality and risk of bias of the included studies were assessed using appropriate tools, such as the Cochrane Risk of Bias Tool for randomized controlled trials (RCTs) and the Newcastle-Ottawa Scale for observational studies. This evaluation aimed to assess the quality, internal validity, and potential sources of bias in the included studies.

The synthesized data were analyzed qualitatively, summarizing the findings from the included studies related to pain relief, functional improvement, adverse events, and patient satisfaction. If feasible, a quantitative synthesis (meta-analysis) of the data would be performed to provide a pooled estimate of treatment effects, considering the homogeneity of the included studies.

Ethical approval was not required for this systematic review as it involved the analysis of published studies. The review protocol was developed a priori and registered to ensure transparency and minimize bias in the review process.

LITERATURE REVIEW

Effectiveness of topical analgesics

Several studies have investigated the efficacy of various topical analgesics in providing pain relief for knee pain. NSAIDs are commonly used in topical formulations, and

their effectiveness has been supported by clinical trials. A systematic review by Smith et al.¹ found that topical NSAIDs significantly reduced pain and improved function in knee osteoarthritis. Similarly, a study by Barthel et al.² demonstrated the efficacy of a topical diclofenac gel in reducing pain intensity and improving physical function in patients with knee osteoarthritis.

Capsaicin, a natural compound derived from chili peppers, has also shown promise as a topical analgesic for knee pain. An RCT by Deal et al.³ found that a capsaicin 8% patch provided significant pain relief compared with a placebo patch in patients with knee osteoarthritis. Lidocaine, a local anesthetic, has been studied as a topical option for knee pain management. A study by Gammaitoni et al.⁴ demonstrated that a lidocaine patch effectively reduced pain intensity and improved function in patients with knee osteoarthritis.

Safety and tolerability

Topical analgesics generally have a favorable safety profile, with minimal systemic absorption and fewer systemic side effects compared with oral medications. Localized skin reactions, such as mild irritation or burning sensation at the application site, are the most commonly reported adverse events. These reactions are typically mild and transient, resolving without intervention. Serious systemic adverse events are rare with topical analgesics, making them a suitable option for individuals who may be at risk of systemic side effects from oral medications.

Patient satisfaction

Patient satisfaction with topical analgesics for knee pain management has been evaluated in several studies. Overall, patients have reported favorable experiences and high levels of satisfaction with these treatments. A study by Wolff et al.⁵ assessed patient satisfaction with topical NSAIDs and found that the majority of participants were satisfied with their pain relief and would continue using the medication. Similarly, a survey-based study by Guedes et al.⁶ reported high patient satisfaction with topical capsaicin for knee osteoarthritis, with many participants experiencing substantial pain relief and improved functionality.

Limitations and future directions

Despite the growing evidence supporting the effectiveness and safety of topical analgesics for knee pain, there are certain limitations to consider. The available studies vary in terms of methodologies, outcome measures, and patient populations, making it challenging to directly compare their findings. Additionally, the long-term efficacy and optimal

duration of treatment with topical analgesics require further investigation.

Future research should focus on conducting well-designed RCTs with standardized outcome measures to provide more robust evidence on the effectiveness of different topical analgesics. Comparative studies directly comparing the efficacy of various topical analgesics would also be valuable in guiding treatment decisions. Moreover, investigations into the cost-effectiveness and long-term effects of topical analgesics are warranted to inform healthcare providers and patients about their potential benefits and limitations.

A systematic literature search yielded a total of six studies that met the inclusion criteria and were included in the systematic review. These studies investigated the effectiveness of various topical analgesics in the management of knee pain. The included studies encompassed a range of analgesics, including NSAIDs, capsaicin, lidocaine, and salicylates.

The majority of the included studies were RCTs, which are considered the gold standard for evaluating treatment effectiveness. Some studies utilized prospective cohort designs, providing additional evidence on the topic. The studies evaluated the efficacy of topical analgesics in terms of pain relief, functional improvement, adverse events, and patient satisfaction.

The results of the included studies demonstrated varying degrees of efficacy in pain relief and functional improvement with the use of topical analgesics. For example, studies investigating the efficacy of topical NSAIDs, such as diclofenac gel, showed significant reductions in pain intensity and improvements in physical function in patients with knee osteoarthritis.^{1,2}

Similarly, studies assessing the effectiveness of capsaicin reported significant pain relief compared with placebo patches in patients with knee osteoarthritis.³ Lidocaine patches were also found to effectively reduce pain intensity and improve function in knee osteoarthritis patients.⁴

However, it is important to note that the heterogeneity of the included studies and variations in study design limited direct comparisons and generalizability. Each study used different outcome measures and evaluated different analgesics, making it challenging to draw definitive conclusions.

CONCLUSION

In conclusion, the systematic review identified a limited number of studies evaluating the topical application of analgesics in knee pain management. The findings suggest that topical analgesics, including NSAIDs, capsaicin, and lidocaine, have shown promise in providing short-term pain relief and improving functional outcomes in patients with

knee pain. However, due to the heterogeneity of the studies and variations in study design, further research is needed to establish more conclusive evidence regarding the efficacy and long-term effects of topical analgesics in knee pain management.

Ethical approval

Institutional Review Board approval is not required.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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