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Review Article

Naproxen Sodium: The Superior Choice Over Dexketoprofen for Dental Pain and Inflammation Management

Barkin Berk *

Istanbul Okan University, Faculty of Pharmacy, Department of Pharmaceutical and Medicinal Chemistry, Tuzla, Istanbul-Turkey

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*Address for Correspondence:

Barkin Berk, Istanbul Okan University, Faculty of Pharmacy, Department of Pharmaceutical and Medicinal Chemistry, Tuzla, Istanbul-Turkey

Abstract

The management of postoperative pain and inflammation following dental procedures, such as dental implants and root canal therapies, is essential to ensure patient comfort and optimal recovery. Nonsteroidal anti-inflammatory drugs (NSAIDs) like Naproxen Sodium and Dexketoprofen are widely utilized due to their effectiveness in controlling pain and inflammation by inhibiting cyclooxygenase (COX) enzymes. This review compares the pharmacological characteristics, onset of action, duration of analgesic effects, and safety profiles of Naproxen Sodium and Dexketoprofen in managing pain associated with dental treatments. Naproxen Sodium's rapid onset of action (within 15 minutes) and prolonged duration (up to 13 hours) make it a superior choice for postoperative pain control, minimizing the need for frequent dosing. Dexketoprofen, while providing pain relief within 30 minutes, has a shorter duration of effect, requiring more frequent administration. Naproxen Sodium also demonstrates superior anti-inflammatory properties and safety profile make it the preferred first-line option over Dexketoprofen for managing pain and inflammation following dental procedures as evidenced by FDA recommendations. The review concludes that Naproxen Sodium offers a more balanced efficacy, safety, and sustained analgesia, making it a preferred NSAID for managing postoperative dental pain and inflammation over Dexketoprofen.

Keywords: Naproxen Sodium, Dexketoprofen, Dental Pain, cyclooxygenase (COX) enzymes

Introduction

The control of postoperative pain and inflammation after dental treatments, including procedures such as dental implants and root canal therapies, is critical to achieving patient comfort and favorable clinical results. Dental implants, widely recognized as the preferred solution for tooth replacement due to their reliability and high levels of patient satisfaction, frequently induce an inflammatory reaction because of the trauma to both soft tissue and bone. This reaction is marked by an increase in inflammatory mediators, resulting in pain that may continue for several days postoperatively. Therefore, effectively addressing this inflammation is vital, with nonsteroidal anti-inflammatory drugs (NSAIDs), such as Naproxen Sodium and Dexketoprofen, playing a key role in managing both pain and inflammation.[1]

Non-steroidal anti-inflammatory drugs (NSAIDs) are commonly utilized analgesics that function by blocking the activity of cyclooxygenase (COX) enzymes, which in turn reduces the production of prostaglandins, the compounds responsible for pain and inflammation. Traditional, non-selective NSAIDs inhibit both COX-1 and COX-2 enzymes. While COX-1 is essential for normal physiological functions, particularly in protecting the gastrointestinal system, its inhibition can result in adverse gastrointestinal effects. On the other hand, COX-2 is predominantly induced during inflammation, and selective COX-2 inhibitors are designed to offer comparable pain relief with reduced gastrointestinal side effects. Nevertheless, despite this selectivity, all NSAIDs, including COX-2 inhibitors, still pose certain cardiovascular risks.[2]

Non-addictive pain relievers, including NSAIDs and paracetamol, are frequently recommended as the first line of treatment for managing pain following outpatient dental procedures. Research has demonstrated that prescription-strength NSAIDs provide significantly better results than placebo in reducing post-operative pain and swelling, particularly after surgeries such as implant placement.[1]

Naproxen Sodium,, one of the most commonly used NSAIDs, provides its anti-inflammatory effects primarily through the inhibition of Cyclo-oxygenase (COX) enzymes, particularly COX-1 and COX-2. These enzymes are crucial for the conversion of arachidonic acid into prostaglandins, which serve as key mediators in processes such as inflammation, pain, and fever. By inhibiting COX enzymes, Naproxen Sodium effectively

reduces prostaglandin production, thus minimizing inflammation and alleviating pain. This action makes Naproxen Sodium especially effective for managing postoperative dental pain and reducing pulpal inflammation in endodontic treatments.[1]

Dexketoprofen, the S(+) enantiomer of the racemic drug Ketoprofen, retains all the properties of NSAIDs but offers improved efficacy and a superior safety profile through a process known as the 'racemic switch.' Compared to Ketoprofen, which is known to have numerous side effects, Dexketoprofen provides a more favorable option. Like other NSAIDs, Dexketoprofen works by inhibiting both COX-1 and COX-2 enzymes, thereby decreasing prostaglandin synthesis, which in turn helps reduce inflammation and pain.[3]

Naproxen Sodium is recognized as an effective nonsteroidal anti-inflammatory drug (NSAID) for managing acute postoperative dental pain. According to the 2024 guidelines from the American Dental Association, nonopioid analgesics are recommended as the first-line treatment, rather than opioid analgesics, for adolescents, adults, and older adults undergoing surgical tooth extractions. Naproxen Sodium may be administered either alone or in combination with paracetamol (e.g., 440 mg of naproxen sodium or 500 mg of paracetamol) to manage postoperative pain. In cases where the combination of NSAIDs and paracetamol does not provide sufficient relief, the guidelines suggest considering low-dose opioids as an additional treatment option. Importantly, Naproxen Sodium remains a reliable choice for controlling pain in both simple and surgical tooth extractions, offering a lower risk of adverse effects compared to opioids.[4]

Given the distinct pharmacological characteristics of Naproxen Sodium and Dexketoprofen, this review intends to compare their anti-inflammatory mechanisms and clinical effectiveness in managing pain associated with dental procedures. By analyzing their modes of action, onset and duration of analgesic effects, and safety profiles, this review aims to provide a thorough evaluation of these two NSAIDs within the realm of dental care. Particularly, Naproxen Sodium's extensive use by dental professionals, owing to its well-balanced efficacy and safety, has established it as the most preferred option in this field. [4]

Results

The comparative evaluation of Naproxen Sodium and Dexketoprofen in addressing postoperative pain and inflammation following dental procedures, such as dental implants, reveals notable differences in their efficacy and safety profiles. Naproxen sodium, in particular, has demonstrated faster absorption compared to its parent compound, naproxen acid. This suggests that the sodium salt formulation may be more suitable for patients dealing with acute pain. Naproxen sodium is well-known for its quick onset of action, which is crucial for effectively managing acute postoperative dental pain. According to a study by Huskisson and Engler (1981), Naproxen Sodium can begin providing significant pain relief within just 15 minutes after administration, making it an ideal option for patients requiring fast pain control. The significance of this rapid onset cannot be overstated in the context of dental care, where prompt pain relief is essential for improving patient satisfaction and enhancing postoperative outcomes.[5]

In addition to its rapid onset, Naproxen Sodium is also recognized for its extended duration of action. A single dose of Naproxen Sodium has been shown to provide pain relief for up to 13 hours, as reported in a study by Aslam (1992). This prolonged effect minimizes the need for frequent dosing, ensuring sustained pain control throughout the critical postoperative period when patients are particularly vulnerable to discomfort. For dental procedures that can cause lasting pain, such as implants or extractions, Naproxen Sodium's capacity to maintain consistent analgesia makes it an ideal choice for clinicians managing postoperative care.[4,6]

Dexketoprofen, by contrast, is also noted for its rapid onset of action, typically providing pain relief within 30 minutes of administration. However, its analgesic effect is relatively short-lived, the elimination half-life is 1.65 hours, which requires more frequent dosing compared to Naproxen Sodium. Although Dexketoprofen can offer fast relief from pain, its limited duration of efficacy makes it less ideal for managing prolonged postoperative discomfort, particularly following more invasive dental procedures such as implants or extractions, where longer-lasting pain control is essential.[7]

The anti-inflammatory characteristics of Naproxen Sodium and Dexketoprofen further set them apart in clinical practice. Naproxen Sodium has been demonstrated to exhibit a significantly superior anti-inflammatory effect compared to paracetamol, particularly in the context of dental implant placement surgery. Naproxen sodium has been found to be more effective than paracetamol in reducing both postoperative pain and systemic inflammation following the surgical placement of one or two dental implants, making it a preferred option for managing inflammation in such cases.[1]

Most studies have focused more on the analgesic properties of Dexketoprofen rather than its anti-inflammatory effects. Notably, only one study following the extraction of impacted wisdom teeth directly compared the anti-inflammatory activity of Dexketoprofen with another NSAIDIn the current study, more objective data were collected using MRI to assess swelling and measuring mouth-opening limitation to evaluate the anti-inflammatory effects of Dexketoprofen. Eroglu et al (2014) found that Dexketoprofen showed insufficient anti-inflammatory efficacy compared to paracetamol which is known as lack of anti-inflammatory effect in managing postoperative complications after impacted third molar surgery. The study concluded that while Dexketoprofen, preemptively administered at safe dosage levels, demonstrated weak anti-inflammatory effects, it provided adequate pain relief. Conversely, paracetamol proved both safe and more effective in terms of clinical outcomes. Additionally, in the evaluation of swelling between the groups based on preoperative

and postoperative measurements, the Dexketoprofen group exhibited significantly higher values on the second postoperative day compared to the paracetamol group. The paracetamol group, on the other hand, demonstrated a 22% lower swelling rate than the Dexketoprofen group. [8]

In a controlled, randomized, double-blind crossover study by G. A. Bjørnsson et al. (2003), patients acted as their own controls to compare the effectiveness of naproxen and paracetamol in recovery after third molar surgery. Results showed that swelling was 20.9% lower in the naproxen group compared to the paracetamol group. [18]

In another study, the assessment of sodium Naproxen Sodium for patients experiencing moderate to severe pain following dental procedures demonstrated a high level of patient satisfaction, with 84% of participants reporting positive outcomes. This further supports the effectiveness of sodium Naproxen Sodium in managing postoperative dental pain.[9]

From a safety standpoint, Naproxen Sodium presents a considerable advantage, especially in terms of cardiovascular risk. In 2005, the FDA's Arthritis and Drug Safety and Risk Management Advisory Committees recommended Naproxen Sodium as the "preferred comparator" for clinical trials assessing COX-2 inhibitors, due to its favorable cardiovascular profile.[11]

Naproxen Sodium consistently outperforms Dexketoprofen in managing postoperative dental procedures, providing more durable pain relief and stronger anti-inflammatory effects, which significantly reduce the need for frequent dosing. Unlike Dexketoprofen, which has a shorter duration of action and limited effectiveness in controlling inflammation, Naproxen Sodium offers a more potent and long-lasting solution, making it the preferred choice for extended postoperative pain management (Table 1) [1-18]

Table1.Comparison of Naproxen Sodium and Dexketoprofen in Dental Pain and Inflammation Management [1-18]

Criteria	Naproxen Sodium	Dexketoprofen
Onset of Action	Begins providing pain relief within 15 minutes.	Provides pain relief within 30 minutes.
Duration of Analgesic Effect	Lasts up to 13 hours, reducing the need for frequent dosing.	The elimination half-life is 1.65 hours, requiring more frequent dosing.
Anti-inflammatory Efficacy	Superior to paracetamol in reducing post-operative inflammation and pain following dental implant surgery.	Insufficient anti-inflammatory efficacy compared to paracetamol.
Gastrointestinal Side Effects	Causes significantly less mucosal injury and fewer gastrointestinal side effects compared to non-selective NSAIDs.	Gastrointestinal safety profile is similar to non-selective NSAIDs.
Cardiovascular Risk	Safest NSAID regarding cardiovascular risk; endorsed by the FDA as the preferred comparator for COX-2 inhibitors due to lower CV risks.	Cardiovascular safety is less established compared to Naproxen Sodium.

Discussion

Naproxen Sodium's role as a leading nonsteroidal anti-inflammatory drug (NSAID) in dental care is well-supported by its favorable balance of efficacy, safety, and duration of action. In managing postoperative pain, particularly after dental procedures such as implants and extractions, Naproxen Sodium has demonstrated several advantages over other NSAIDs, including Dexketoprofen. One key factor that differentiates Naproxen Sodium is its rapid onset of action, which begins within 15 minutes of administration, allowing for timely pain relief, crucial in acute postoperative settings . Moreover, the sodium formulation of Naproxen Sodium offers improved absorption, enhancing its effectiveness in addressing immediate postoperative discomfort.[5]

In addition to its quick onset, Naproxen Sodium's prolonged duration of action up to 13 hours makes it a preferred option for managing extended postoperative pain. This feature reduces the need for frequent dosing, which not only improves patient compliance but also ensures continuous pain control during the critical recovery period . In contrast, although Dexketoprofen provides a comparable onset of action, its shorter duration, the elimination half-life is 1.65 hours, makes it less ideal for extended pain management when continuous relief is required.[4,6,7,17]

When evaluating anti-inflammatory properties, Naproxen Sodium has demonstrated superior efficacy compared to paracetamol, particularly following dental implant surgery. This makes it a robust choice for managing both pain and inflammation in dental settings. Although Dexketoprofen is recognized for its analgesic properties, studies have suggested that its anti-inflammatory effects may not be as strong as those of Naproxen Sodium, especially in cases like impacted third molar extractions.[1]

In a separate study, the assessment of sodium Naproxen Sodium for managing moderate to severe pain in patients following dental procedures demonstrated a high level of patient satisfaction. Specifically, 84% of the participants reported being satisfied with the pain relief provided by

sodium Naproxen Sodium. This strong satisfaction rate underscores the effectiveness of Naproxen Sodium in controlling postoperative dental pain and enhancing overall patient comfort, particularly in situations where pain levels are more intense, such as after surgical dental interventions.[10]

Naproxen Sodium stands out as the safest NSAID, particularly with respect to cardiovascular risk, as highlighted by the FDA's endorsement of its use as a preferred comparator in clinical trials for COX-2 inhibitors. In terms of gastrointestinal safety, Naproxen Sodium causes significantly less mucosal injury and is associated with fewer side effects compared to traditional NSAIDs. These attributes make Naproxen Sodium a safer choice, especially for patients at risk of cardiovascular events or those with concerns about gastrointestinal complications. Compared to Dexketoprofen, Naproxen Sodium offers a significantly safer profile regarding both cardiovascular risk and gastrointestinal side effects, making it a more suitable option for patients requiring long-term NSAID therapy. Additionally, Naproxen Sodium provides longer-lasting analgesia, with fewer patients needing rescue medication, further underscoring its sustained effectiveness. [11-16]

Naproxen Sodium distinguishes itself as a well-rounded option for managing both postoperative pain and inflammation in dental care, offering a balance of rapid onset and extended duration of action. While it provides quick pain relief, its prolonged analgesic effect, lasting up to 13 hours, reduces the need for frequent dosing, making it ideal for sustained pain management during recovery. Additionally, its favorable safety profile, particularly in terms of cardiovascular risk, further supports its use over Dexketoprofen. Although Dexketoprofen may be effective for short-term pain relief, Naproxen Sodium's combination of rapid onset, long-lasting analgesia, and superior safety makes it the more reliable and preferred choice for dental practitioners managing extended postoperative discomfort and inflammation.

Conclusion

Naproxen Sodium, its prolonged analgesic effect, superior anti-inflammatory properties and safety profile make it the preferred first-line option over Dexketoprofen for managing pain and inflammation following dental procedures.

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