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Over-the-Counter (OTC) Analgesics in Dentistry: Patterns of Use, Safety, and Efficacy

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Abstract

Over-the-counter (OTC) analgesics are commonly used for the initial management of dental pain due to their accessibility and fast-acting relief. In dentistry, medications such as ibuprofen, paracetamol, and aspirin are frequently recommended for conditions ranging from toothache to postoperative discomfort and minor oral infections. These drugs are favored for their proven pharmacokinetics, including rapid onset and high oral bioavailability, making them valuable tools for both clinicians and patients. In addition to pharmacological treatments, non-drug adjuncts like cold therapy and chlorhexidine mouthwash are also employed to manage symptoms. However, the ease of access to OTC medications has led to challenges such as overuse, unsupervised consumption, drug interactions, and potential adverse effects, particularly in vulnerable populations. This review explores current trends in the use of OTC analgesics within dental practice, evaluates their mechanisms of action and clinical effectiveness, and addresses concerns surrounding their safe use. By examining these factors, the paper aims to highlight the therapeutic benefits and potential risks associated with self-medication practices in dental pain management. Ultimately, it underscores the importance of increased patient education and professional oversight to ensure safe, effective, and evidence-based use of these common analgesics, thereby reducing health hazards and improving overall outcomes in dental care.

Keywords: Analgesics, COX, Dental Pain, NSAIDS, OTC.

Introduction

Dental pain is a frequent and often distressing experience that can significantly impact an individual's quality of life. From a simple toothache to post-surgical discomfort, the need for effective pain management in dentistry is paramount (1). Over-the-counter (OTC) analgesics play a crucial role in addressing this need, providing readily accessible and convenient options for managing mild to moderate dental pain (2). These medications, available without a prescription, empower individuals to take control of their pain relief, offering a sense of autonomy and immediate symptom management (2). However, the ease of access and self-administration also raise concerns about potential misuse, overuse, and adverse effects (3).

Paracetamol (acetaminophen) is an antipyretic and analgesic drug with little to no anti-inflammatory action. It is an effective drug to use for postoperative pain following any dental procedure as it is a reportedly safe drug to use in patients with contraindications to other NSAIDs. Ibuprofen, a non-steroidal anti-inflammatory drug (NSAID), is most commonly used in dentistry due to its potent analgesic, antipyretic and anti-inflammatory properties. Ibuprofen's anti-inflammatory properties help reduce swelling and pain associated with dental procedures (4). Naproxen is another OTC NSAID with a longer duration of action than Ibuprofen making it convenient to manage persistent pain (5). Aspirin which is another NSAID with antipyretic, analgesic and anti-inflammatory properties, is less commonly used due to its higher tendency to cause gastrointestinal side effects and bleeding risks. It is rarely used in dentistry as it poses a higher risk of bleeding in the patient's undergoing dental surgery or extractions due to its irreversible

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inhibition of thromboxane A2. The choice among these medications should be based on patients' medical history, the nature of dental pain and the duration of use (6).

Dental pain is commonly managed using OTC analgesics, offering immediate relief with ease of access. However, safe and effective use requires understanding of pharmacokinetics (half-life, onset of action, bioavailability) and mechanisms of action. Additionally, non-pharmacological adjuncts play a supportive role. This review provides a comprehensive overview of OTC analgesics in dentistry, including their safety profiles and clinical implications for diverse patient populations (7). This review article aims to provide a comprehensive overview of OTC analgesics in dentistry, examining their patterns of use, safety, and efficacy. By synthesizing current evidence and addressing key considerations, this review seeks to inform dental professionals and the public about the appropriate use of OTC analgesics in managing dental pain.

Patterns of Use

Prevalence of OTC Analgesic Use: The use of OTC analgesics is highly prevalent among individuals experiencing dental pain. Studies have shown that a significant proportion of patients attending primary healthcare centers report using OTC analgesics for pain relief. For instance, one study conducted in Jeddah, Saudi Arabia, revealed that 84.4% of participants used OTC analgesics, with 59.3% using them at least twice per week. Similarly, a study in Malaysia found that 29.4% of participants self-medicated with analgesics for dental pain (8). These figures highlight the widespread reliance on OTC analgesics for managing dental pain in various populations.

Factors Influencing OTC Analgesic Use: Several factors contribute to the widespread use of OTC analgesics for dental pain. Self-medication is an emerging practice in dentistry, where individuals diagnose, select, and administer oral health remedies without professional guidance. Cultural beliefs, healthcare access, and patient knowledge play significant roles in shaping self-medication practices (9). The accessibility and convenience of OTC medications, coupled with the desire for immediate symptom relief and cost-effectiveness, often drive individuals to choose self-medication over seeking professional dental care. Furthermore, online information, e-commerce, mobile applications, and social media influence self-medication practices in dentistry (10). Another factor influencing OTC analgesic use is the perception of pain severity. Individuals experiencing mild to moderate dental pain may perceive it as manageable with OTC medications, while those with severe pain may seek professional dental care (11). The perceived need for a quick and convenient solution also contributes to OTC analgesic use, particularly in situations where access to dental care is limited or delayed (12).

Types of OTC Analgesics Used in Dentistry: The most common types of OTC analgesics used in dentistry include nonsteroidal anti-inflammatory drugs (NSAIDs) and aniline analgesics. NSAIDs, such as ibuprofen, are widely used for their analgesic and anti-inflammatory properties. Ibuprofen inhibits prostaglandin synthesis, reducing inflammation and pain associated with dental conditions. Aniline analgesics, such as acetaminophen (paracetamol), are also commonly used for pain relief, although their mechanism of action is not fully understood. Acetaminophen is often preferred for individuals who cannot tolerate NSAIDs or have contraindications (13).

Trends in OTC Analgesic Use: Trends in OTC analgesic use in dentistry reflect broader shifts in healthcare practices and consumer behaviour. The increasing availability of information online and the rise of e-commerce have made it easier for individuals to access and purchase OTC medications. Mobile applications and social media also play a role in influencing self-medication practices, with individuals sharing experiences and recommendations on various platforms (14).

Another trend is the growing awareness of potential risks associated with opioid analgesics, leading to a greater emphasis on non-opioid alternatives like OTC NSAIDs and acetaminophen. This shift is driven by concerns about opioid abuse, addiction, and adverse effects, as well as efforts to promote responsible pain management practices.

Safety of OTC Analgesics in Dentistry: Adverse Effects and Risks: While OTC analgesics are generally considered safe when used as directed, they are not without potential adverse effects and risks. NSAIDs, such as ibuprofen, can cause gastrointestinal side effects, including stomach upset, heartburn, and ulcers (6). They may also increase the risk of cardiovascular events, such as

heart attack and stroke, particularly in individuals with pre-existing cardiovascular conditions (10). Acetaminophen, while generally well-tolerated, can cause liver damage if taken in excessive doses or in combination with alcohol.

Other potential risks associated with OTC analgesic use include allergic reactions, drug interactions, and masking underlying dental conditions. Allergic reactions can range from mild skin rashes to severe anaphylaxis, requiring immediate medical attention (15). Drug interactions can occur when OTC analgesics are taken with other medications, potentially altering their effects or increasing the risk of adverse events. Masking underlying dental conditions can delay diagnosis and treatment, leading to more serious complications.

This review synthesizes current evidence on OTC analgesics in dentistry, highlighting the need for comprehensive patient education regarding correct dosing, risks, and potential interactions. Dental professionals should guide patients in safe use, emphasizing that OTC medications supplement but do not replace professional dental care for persistent or severe pain. Incorporating non-pharmacologic adjuncts may optimize pain control with fewer side effects.

Discussion

Contraindications and Precautions

Certain individuals should exercise caution when using OTC analgesics or avoid them altogether due to contraindications and precautions. Pregnant women, for example, should consult their healthcare provider before using any OTC medication, as some analgesics can harm the developing fetus (16). Individuals with a history of gastrointestinal ulcers, kidney disease, or liver disease should also use caution when taking NSAIDs or acetaminophen (6, 8). Patients taking anticoagulant medications, such as warfarin, should avoid NSAIDs due to the increased risk of bleeding (17). Individuals with aspirin sensitivity or asthma may also be at higher risk of adverse reactions to NSAIDs (6). It is essential to read and follow the instructions on the OTC analgesic label and consult a healthcare professional if there are any concerns or questions (2, Table 1).

Ibuprofen is the most frequently used NSAID for dental pain due to its analgesic and anti-inflammatory benefits. Paracetamol is preferred when NSAIDs are contraindicated. Naproxen offers a longer duration of pain relief but is less commonly used. Patterns of use vary based on accessibility, cultural practices, and patient knowledge, often influenced by self-medication trends. Overdose and Toxicity: Overdose and toxicity are serious risks associated with OTC analgesic use, particularly with acetaminophen. Acetaminophen overdose can cause severe liver damage, leading to liver failure and death (11). The maximum daily dose of acetaminophen for adults is typically 4000 mg, but lower doses may be recommended for individuals with liver disease or other risk factors. Symptoms of acetaminophen overdose may include nausea, vomiting, abdominal pain, and jaundice. If an overdose is suspected, immediate medical attention is crucial. Treatment for acetaminophen overdose involves administering N-acetylcysteine (NAC), an antidote that can prevent or reduce liver damage if given within a certain timeframe (12). Drug Interactions: OTC analgesics can interact with various other medications, potentially altering their effects or increasing the risk of adverse events (10). NSAIDs, for example, can reduce the effectiveness of certain blood pressure medications and increase the risk of bleeding when taken with anticoagulants (13, 16). Acetaminophen can interact with alcohol and certain other medications, increasing the risk of liver damage (12). It is essential to inform healthcare providers about all medications being taken, including OTC analgesics, to avoid potential drug interactions (13). Patients should also read the labels of all medications carefully and consult a pharmacist or healthcare provider if they have any questions about potential drug interactions (18).

Non-Pharmacological Alternatives

In addition to OTC analgesics, several non-pharmacological alternatives can be used to manage dental pain. Chewing gum has been suggested as a non-pharmacological alternative for orthodontic pain relief (17). Other non-pharmacological approaches include applying ice packs, rinsing with warm salt water, and using topical anaesthetics. These methods can be used alone or in combination with OTC analgesics to provide comprehensive pain relief (8).

Table 1: Summary of Interactions and Contraindications of OTC Drugs

OTC Drugs	Interacts With	Contraindications
Ibuprofen	Warfarin, Corticosteroids, ACE inhibitors	GI ulcers, renal diseases, and uncontrolled hypertension
Aspirin	Warfarin, Methotrexate, SSRIs, Alcohol	Bleeding disorders, GI ulcers, Asthma
Paracetamol	Alcohol, hepatotoxic drugs	Liver disease, chronic alcohol abuse
Naproxen	Warfarin, SSRIs, Diuretics	Renal impairment, GI bleeding history

Mechanism of Action

Ibuprofen exerts its analgesic and anti-inflammatory effects by inhibiting cyclooxygenase enzymes COX-1 and COX-2 in peripheral tissues, reducing prostaglandin synthesis at inflammation sites. Paracetamol primarily acts centrally by inhibiting COX enzymes in the brain, modulating pain and fever with minimal peripheral anti-inflammatory activity. This distinction explains differences in efficacy and side effect profiles between the drugs.

Recommendations for Safe and Effective Use

Patient Education: Patient education is crucial for promoting the safe and effective use of OTC analgesics in dentistry. Dental professionals should educate patients about the potential risks and benefits of OTC analgesics, as well as appropriate dosages, contraindications, and precautions (2). Patients should also be informed about potential drug interactions and the importance of informing healthcare providers about all medications being taken (18).

Pharmacokinetics: Ibuprofen has a half-life of approximately 2 hours and an onset of action within 30 minutes after oral administration. It displays high oral bioavailability, exceeding 80%. Paracetamol's half-life ranges from 2 to 3 hours, with analgesic effects typically beginning 30 to 60 minutes post-ingestion. These properties support their effectiveness for rapid pain control in dental settings.

Professional Guidance: Dental professionals should provide guidance to patients on the selection and use of OTC analgesics, considering their individual medical history, current medications, and pain severity (2). They should also emphasize the importance of seeking professional dental care for persistent or severe dental pain, rather than relying solely on self-medication (4).

Dosage and Administration: Patients should be instructed to follow the recommended dosage and administration guidelines on the OTC analgesic label. Exceeding the recommended dose can increase the risk of adverse effects, particularly with acetaminophen. The lowest effective dose should be used for the shortest duration necessary to manage dental pain (8).

Monitoring and Follow-Up: Patients using OTC analgesics should be monitored for potential adverse effects and treatment outcomes. If symptoms persist or worsen, patients should be advised to seek professional dental care. Follow-up appointments may be necessary to assess the effectiveness of treatment and adjust medication regimens as needed (19).

Conclusion

Over-the-counter (OTC) analgesics play a significant role in managing dental pain, providing readily accessible and convenient options for pain relief. However, the ease of access and self-administration also raise concerns about potential misuse, overuse, and adverse effects. By understanding the patterns of use, safety profiles, and efficacy of OTC analgesics, dental professionals can provide guidance to patients on the safe and effective use of these medications. Patient education, professional advice, and responsible self-medication practices are essential for optimizing pain management outcomes and minimizing potential risks. Dentists should advise patients on the proper use of over-the-counter pain killers and take individual risk factors into account to guarantee both therapeutic effectiveness and safety.

Abbreviation

None.

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All authors are equally contributed.

Conflict of Interest

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