

# Investigating the Pain Relief Effect of Ibuprofen, Paracetamol, and Diclofenac Potassium for Pain Relief in Orthodontic Surgeries

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## Abstract

This randomized controlled study was conducted between November 2020 and May 2022 in the Russian Federation. It is used to treat muscle aches, backaches, dental pain, menstrual cramps, and sports injuries. It also reduces pain, swelling, and joint stiffness caused by arthritis. Reducing these symptoms helps you do more of your normal daily activities. This medication is known as a Nonsteroidal Anti-Inflammatory Drug (NSAID). Furthermore, each patient was observed preoperatively and immediately postoperatively for signs of distress by using a 5-point face scale. There were significant decreases in distress scores between the preoperative and postoperative scores ( $p=0.0001$ ). As a result, the use of continuous diclofenac sodium as a single dose before root canal treatment was recommended. Ibuprofen can reduce pain after root canal treatment for a longer period of time than root canal treatment.

**Keyword:** Orthodontic surgeries; Ibuprofen; Paracetamol; Diclofenac potassium

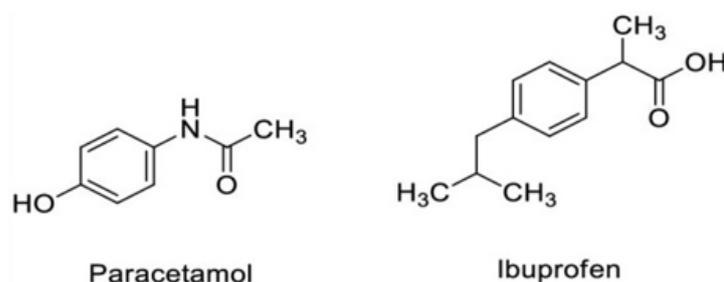
## Introduction

In modern cultures, pain is a prevalent and growing issue. It could happen on purpose or accidentally. Although it has been said that everyone has the right to be pain-free [1,2], this is not always the case. For treating mild to moderately severe pain, doctors frequently prescribe locally accessible analgesics like Aceclofenac, Diclofenac, Naproxan, Ketorolac, Paracetamol (acetaminophen), and Ibuprofen in Bangladesh. These medications cause gastrointestinal distress, which may also include bleeding or ulcers of the stomach [3]. Because of this, extra medications are recommended to combat these side effects [3]. Since they are more effective NSAIDs with significantly fewer gastrointestinal side effects than other NSAIDs, paracetamol and ibuprofen are more routinely recommended [4]. In practical practice, it is typical to prescribe both acetaminophen and ibuprofen at the same time. N-acetyl-p-aminophenol, generally known as paracetamol or acetaminophen or APAP, is a commonly used over-the-counter analgesic (pain reliever) and antipyretic (fever reducer) [5]. At the prescribed amount of 4g per day, acetaminophen is relatively safe and frequently used [6].

Although the precise mechanism of action of paracetamol is unknown, it seems to include the suppression of a subclass of cyclooxygenase enzyme isoforms in the central nervous system. The most popular NSAID is ibuprofen, which is also widely recommended. It inhibits Cyclo-Oxygenase-1 (COX-1) and Cyclooxygenase-2 (COX-2) non-selectively. Ibuprofen is sold in tablets with a 200-800mg potency [7]. Ibuprofen has the benefit of a proven track record of safety (especially at doses below 1.5g per day in adults). Ibuprofen and paracetamol tablets (200/500mg) are widely recommended for the short-term alleviation of mild to moderate pain brought on by migraine, headache, backache, period pain, rheumatic and muscle pain,

non-serious arthritis pain, cold and flu symptoms, sore throat, and fever [8]. This medicine is particularly useful for pain that needs more potent analgesia than what can be obtained from ibuprofen or paracetamol alone [9] (Figure 1). The preemptive approach focuses on delivering the analgesic before the painful stimulus, to prevent or pre-empt the afferent input that amplifies the pain. Preemptive analgesic administration is an anti-nociceptive therapy, which decreases postoperative pain by preventing altered afferent input. As most of the patients present with pain preoperatively

have higher levels of inflammatory mediators being released [10]. Thus, pre-treatment analgesia decreases the establishment of central sensitization, a mechanism by which spinal neurons increase their response to the peripheral nociceptive impulse. Whereas, the preventive approach is not time-related and may or may not be initiated before the treatment and is defined by reduced postoperative pain or analgesic consumption, relative to the treatment [11].



**Figure 1:** Chemical Structure of paracetamol and ibuprofen.

Over instrumentation, periapical extrusion of irrigant/medicament, and restoration in hyper occlusion are chief causes that often provoke an acute inflammatory response, resulting in a mid-treatment flare-up. Anti-inflammatory analgesics, systemic steroids, and anxiolytics are few of the commonly used preoperative drugs used during endodontic practice. Pretreatment analgesia has been defined as an antinociceptive treatment that prevents altered processing of afferent input amplifying postoperative pain. This technique may decrease the establishment of central sensitization, a mechanism whereby spinal neurons increase their responsiveness to peripheral nociceptive input. The data on Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) administration for efficient postoperative pain control in patients receiving root canal therapy has been thoroughly examined in prior systematic reviews. Prostaglandin production at the sites of inflammation is primarily inhibited as the principal mode of action. Non-narcotic analgesics have been found to have a positive effect in some studies, whereas others say they have no effect. Other medications, including corticosteroids and opioids, are employed singly or in combination to relieve endodontic pain [12].

There hasn't been any research comparing the analgesic effects of ibuprofen to sustained-release non-steroidal anti-inflammatory medication Diclofenac sodium so far (a common painkiller in dentistry). This study compares the effects of a single dose of Diclofenac sodium with sustained release. After a root canal, Ibuprofen was successful in lowering discomfort. This research was carried out in 2020-2022 in research and dental centers, Med Amulet Clinic, Russia.

## Materials and Methods

The present study is a prospective randomized, double-blinded pilot clinical trial. The study was conducted in the Department of

Conservative Dentistry and Endodontics at a university-affiliated hospital [13].

## Drug preparation

For the ibuprofen group, 30 ibuprofen 400mg tablets (Synthol, Moscow, Russia) were ground up individually in a mortar before being combined with an empty capsule of the same shape. The contents of 30 Modafnak 100mg capsules (Rostek, Moscow, Russia) were inserted individually within 30 empty capsules resembling ibuprofen capsules for the diclofenac sodium continuous release group. Similar to the first two groups, 30 empty capsules were filled with starch powder for the placebo group. A third party coded each of the three groups, in order for neither the project managers nor the patients to be aware of the type of medication being utilized. In addition, the codes for the drug categories were opened and determined using a statistical analysis [14]. Following treatment, there were study time periods of 0, 2, 6, 10, 18, and 36 hours. On a specific line for the same time period, the patient was asked to indicate their level of pain on a scale of 0 to 10. The patient's pain measurement form was obtained at the time of the subsequent visit. Statistical techniques were applied to the data using the SPSS software's Repeated Measurement ANOVA, Mann-Whitney U, and Kruskal-Wallis test [15].

## Result and Discussion

According to the findings, ibuprofen is just as good at reducing post-endodontic pain as etoricoxib. The analgesics were also well tolerated by the patients. The standard NSAID is ibuprofen, which is currently the medicine of choice for post-endodontic discomfort. NSAIDs are generally regarded as the treatment of choice for treating acute dental pain in ambulatory individuals, who typically experience a greater rate of side effects after

taking opiate analgesics, absent any specific contraindications. Numerous studies examining the effectiveness of COX-2 inhibitors for the management of surgically generated dental pain failed to demonstrate any distinct therapeutic advantage over ibuprofen. Since 45 percent of patients feel pain after receiving a root canal, and roughly 25 percent of those patients have moderate to severe pain, dentistry continues to prioritize pain control following root canals, and research into the best pain management strategies is crucial.

Non-steroidal anti-inflammatory medicines are efficient in managing such pains because dental pain is brought on by the inflammation process in the pulp and periodical area. As a result, non-steroidal anti-inflammatory drugs are more frequently prescribed than steroid, narcotic, or acetaminophen. The drug diclofenac sodium is also effective for treating these aches. The administration of a continuous dose of diclofenac (100mg) prior to root canal therapy as compared to one ibuprofen (400mg) is able to relieve discomfort for a longer period of time, per the study's findings. Cut back on root therapy. Additionally, based on the findings of this study, it was found that the effects of Modafnak start acting later than those of ibuprofen, so it is advised to take this medication at least 2 hours prior to receiving a root canal in order to maximize the effects of continuous release diclofenac in the first few hours following the procedure [16].

## Conclusion

When compared to the preventive regimen, prophylactic analgesic administration appeared to be useful in reducing the level of postoperative pain and analgesic consumption in participants undergoing single-visit root canal treatment, and as a result, the use of continuous diclofenac sodium as a single dose before root canal treatment was recommended. Ibuprofen can reduce pain after root canal treatment for a longer period of time than root canal treatment.

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