

Efficacy of Celecoxib and Naproxen Sodium After Non-Surgical Extraction of Permanent Teeth: A Randomized Control Study

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ABSTRACT

Objective: To compare the level of pain relief that two NSAID salts offer following a simple closed tooth extraction technique, as well as to assess patient adherence to the prescribed dosage schedule.

Methodology: This Randomized Control Design study was conducted at Islamabad medical & dental college, from 2018-2019. 150 patients made up the sample, who were split into two equal groups using a computerized lottery system: the experimental group and the control group. Following tooth extraction under local anesthesia, participants in the experimental group were told to take one 200 mg tablet of celecoxib orally for two days, while the control group was administered two 550 mg tablets of Naproxen Sodium orally twice a day. The standard Visual Analogue Scale (VAS) was used to assess post-extraction pain after 24 and 48 hours. Patients' adherence was verified by having them fill out a Performa form by phone call after 48 hours. After collection of Data, analysis was done with the help of SPSS version 21.0.

Results: After tooth extraction, both medications were similarly effective in reducing pain, although participants adhered to the OD dose of celecoxib substantially more than the BD dose of naproxen sodium.

Conclusion: There was statistically insignificant difference in pain relief provided by Celecoxib and Naproxen Sodium after 24 and 48 hours of single tooth extraction.

Key words: Analgesia, post extraction pain, adherence, compliance.

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Introduction

Pain is thought of as an unpleasant feeling brought on by any unpleasant stimuli from the environment. Early in life, a person learns to associate the word "pain" with sickness, accidents, or negative experiences.¹

Patients who have tooth pain, also known as odontalgia, may undergo different dental operations (such as extractions or restorations) based on the degree or kind of their condition. Approximately 35% of untreated dental

caries cases worldwide result in tooth pain and necessitate extraction.²

Every dentist working in the area faces the difficulty of providing patients with adequate pain management following surgery. A significant amount of study has been done on the application of different pain management techniques both during and after procedures. Pain can range from minor to severe during almost all dental treatments, so it's crucial to take pain management into account at every stage of the process.³A study conducted in 2002 to evaluate the expected pain levels following

dental operations revealed that patients had more pain following tooth extraction than following root canal therapy or other restorative procedures.⁴

Tooth extraction is defined as "the painless removal of the tooth from its socket"⁵

It is a commonly used method that combines the concepts of physical mechanics and surgery to treat oral cavity disorders. When someone experiences severe pain following tooth loss, NSAIDs are administered all around the world. They are suggested for the treatment of rheumatologic, viral, and traumatic upheaval.⁴ There is a common delusion that all NSAIDs have equal therapeutic adequacy, they have peculiar source, potency, biochemical structure. Some traditional NSAIDs are available over the counter (OTC) and it is estimated that their unprescribed usage is seven times higher than recommended ones. The approximate sale of NSAIDs is around 7 billion dollars per annum.⁵

The COX enzymes are found in two isoforms: COX-1 and COX-2.⁶ Constitutive enzymes found in normal cells, COX-1 produces baseline levels of PG, which protects the gastric mucosa and activates platelets (homeostasis). By developing in cells that are activated in areas of damaged tissue, COX-2 enzymes help to regulate the pathological process and promote the healing and repair of harmed cells.⁷ Additionally, there are two types of non-steroidal anti-inflammatory drugs (NSAIDs): selective and non-selective. These were developed based on how well they inhibited COX enzymes. The phrase "classical" or "traditional" NSAIDs refers to non-selective COX inhibitors that inhibit both COX enzymes. Indomethacin, meloxicam, peroxicam, ketorolac, naproxen, diclofenac, flubiprofen, and indomethacin are a few examples. COX Inhibitors This new class of medications was developed with the goal of creating a novel regimen that would inhibit solely COX-2 enzymes and maximally preserve the gut lining. Celecoxib, rofecoxib, valdecoxib, etoricoxib, and lumiracoxib are a few examples.⁸

Another element that helps a treatment be successful is adherence. It is characterized as patients' compliance with taking their prescribed medications, and it is evaluated to determine the efficacy of prescribed therapy.⁹ Compliance and Adherence In research, these concepts are interchangeable and can be evaluated using a variety of techniques, depending on the needs of the investigation. None of the approaches that are currently in use are regarded as the gold standard. Asking the patient about how he takes his medication is one of the direct ways a

doctor might measure compliance or adherence for study reasons.¹⁰ Selective COX-2 inhibitor prescription is not routinely administered following dental treatments; instead, standard NSAIDs are supplied in short succession. To provide an explanation for drug use, extensive expertise and understanding are required. This brings us to the justification for this study, which was to basically find out how safe and effective various NSAID salts were based on two variables: pain relief and adherence to prescription, which allowed for the search for more effective medications in terms of pain relief following non-surgical tooth extraction and frequency of prescribed dose-regime. The medication that was able to reduce pain more effectively in a greater number of devoted participants would be given a higher weight than the alternative and could. The drug which was able to curb pain more efficiently with larger number of adherent participants would be weighed better than the other and could be prescribed with more confidence in future. The drug which was able to cure pain more efficiently with larger number of adherent participants would be weighed better than the other and could be prescribed with more confidence in future.

Methodology

The study was a one-year randomized controlled trial conducted at the OMFS department of Islamabad Dental Hospital, Islamabad from 2018-2019. A pilot study with 12 patients per group preceded the main study. The final sample size was 150 patients, with 75 in each group. Patients aged 18 to 40, classified as ASA-1, were included, while those unresponsive to researcher calls, with prior analgesic use, or allergies to the study drugs were excluded. Participants in the control group received 550 mg Naproxen Sodium tablets twice daily for two days post non-surgical tooth extraction, while the experimental group received 200 mg Celecoxib once daily for the same duration. Pain levels were assessed using the Visual Analogue Scale (VAS) at 24- and 48-hours post-extraction. Randomization was achieved, and medications were dispensed in pre-prepared packets. Tooth extractions were performed following standard protocol, with post-extraction instructions provided. Participants were reminded to take medications and report any discomfort. Data collection involved phone calls at 24 and 48 hours, assessing pain levels and medication adherence. SPSS version 24 was used for data analysis, employing Wilcoxon Signed Rank and Mann Whitney U tests, with $p < 0.05$ indicating significance. Compliance was assessed via Chi-Square test.

Results

The overall mean age and standard deviation (S.D) was 29.49 ± 6.25 with the range of 22, from 18 to 40 years. In the total sample of 150 patients, there were 59 (39.3%) males and 91 (60.7) females.

Wilcoxon Signed Rank test was applied to evaluate the pain scores after 24 hours and 48 hours irrespective if the medicine used, shown in table I. It is clear from the output that there were only 2 patients (number of negative ranks) who had more pain after 48 hours i.e. higher pain score after 48 hours as compared to 24 hours. There are 116 patients (number of positive ranks) who had lower pain score after 48 hours. Finally, there were 32 patients who had same pain score after 24 hours and 48 hours as well.

Table I: Rank table for Wilcoxon Signed Rank test.

		N	Mean Rank	Sum of Ranks
score after 24 hours -	Negative Ranks	2 ^a	95.00	190.00
score after 48 hours	Positive Ranks	116 ^b	58.89	6831.00
	Ties	32 ^c		
	Total	150		

a. score after 24 hours < score after 48 hours

b. score after 24 hours > score after 48 hours

c. score after 24 hours = score after 48 hours

Mann-Whitney U test was applied to test the difference between two groups after 24 hours and 48 hours separately. A p-value of < 0.05 was considered significant at 95% confidence level. Table II

Table II: Mann-Whitney U Test: After 24 & 48 hours.

Group	N	Mean Rank	Sum of Ranks	p-value
Control	75	75.15	5636.50	
Experimental	75	75.85	5688.50	0.46
After 48 hours				
Control	75	71.19	5339.00	
Experimental	75	79.81	5986.00	0.08

The Chi-square test was applied to explore the adherence of the patients to the medicine, among both the groups.

Table 1.4: Adherence within both groups.

		Did you feel any difficulty in taking medicine?		Total
		yes	no	
Group	control	23	52	75
	experimental	8	67	75
Total		31	119	150

Discussion

Analgesics play a crucial role in managing post-tooth extraction pain and discomfort, aiming for rapid pain relief and improved patient comfort. Various studies have investigated the efficacy of different classes of

nonsteroidal anti-inflammatory drugs (NSAIDs) in this context.¹¹

For instance, a study conducted on the Saudi population by Gazal G and colleagues evaluated the analgesic efficacy of diclofenac potassium, paracetamol, and ibuprofen before and after dental extractions and cavity preparation.¹² Their findings indicated a reduction in distress levels with preemptive analgesia. Similarly, in our present study, the efficacy of Naproxen Sodium and Celecoxib was examined following single tooth removal using a closed surgical technique, demonstrating significant pain reduction post-procedure.¹³

Moreover, comparisons between NSAIDs and opioid-based analgesics have been a subject of interest in dental pain management research. Stephen and colleagues assessed the efficacy of naproxen sodium against hydrocodone/acetaminophen for post-surgical dental pain. Their study concluded that naproxen was comparable to hydrocodone/acetaminophen in the early hours post-procedure but exhibited superior pain relief over 12 hours and was better tolerated by patients.

In our study, Naproxen Sodium 550 mg administered twice daily for two days effectively controlled pain, with patients exhibiting good tolerance and minimal adverse effects.

Furthermore, the duration and technique of dental procedures are crucial factors influencing post-operative outcomes. Nikhat Akbulut and co-researchers compared three analgesics following third molar extraction, considering post-op pain, swelling, and trismus. Similarly, Isola and colleagues conducted a comparative study on post-op pain after surgical extraction of wisdom teeth, evaluating celecoxib, ibuprofen, and placebo treatments. Both studies underscored the significance of analgesic selection in managing post-operative pain effectively.¹⁴

In a similar study, Isola and co-researchers conducted a comparative study for post-op pain after surgical extraction of wisdom teeth with celecoxib, ibuprofen and placebo treatment; concluded that celecoxib significantly reduced the pain parameter as compared to other interventions. In current study, celecoxib and naproxen sodium therapeutically were equally effective in controlling pain after tooth removal.¹⁵

In conclusion, the choice of analgesic regimen, procedural technique, and patient tolerability collectively contribute to successful pain management following dental procedures. While NSAIDs like Naproxen Sodium and

Celecoxib demonstrate efficacy in controlling post-tooth extraction pain, further research is warranted to explore optimal analgesic strategies tailored to individual patient needs and procedural nuances.

Conclusion

After a single tooth extraction, celecoxib and naproxen sodium have therapeutically comparable efficacy in managing pain. When comparing the two medications' analgesic efficacy after 24 and 48 hours, there is a statistically negligible difference. Following tooth extraction, the adherence of research participants was higher for the OD dose of celecoxib, and it was determined that the effectiveness of celecoxib as a single dose was comparable to the BD dose of Naproxen sodium.

LIMITATIONS: Study was carried out on a smaller sample size and in a single hospital setting on healthy individuals. The pain scores recorded are noted after single tooth removal following closed extraction technique.

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