

Comparative analysis of the efficacy of Paracetamol and Naproxen as a preemptive analgesia following surgical dental extraction

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ABSTRACT

Compare the efficacy of Naproxen and Paracetamol as preemptive analgesia following surgical tooth extraction. A randomized, double-blind, parallel, study was conducted in a private dental clinic. The participants signed a free and informed consent form. All participants (n = 40; both genders; 20–29 years old) were indicated for extraction of a tooth. Patients with chronic illnesses, allergic to drugs used in the study, pregnant or lactating participants, smoker or patients used analgesia one week before the surgery were excluded. All the 40 participants were randomized into two groups (Group A and Group B), each group having 20 participants. They double-blindly received single oral doses of naproxen mg or paracetamol 1 gm 60 min before the extraction, and the doses were packed in an envelope and coded by numbers for later identification

Forty participants were randomly selected for the study. Participants who were given Naproxen have shown a higher analgesic effect compared to Paracetamol (1000 mg). Participants that took the first rescue analgesic dose after 3 hours are more in the Paracetamol group. While those who took the first rescue analgesia dose at 5 hours are more in the Naproxen group. In the dental clinics, teeth extraction has become a routine procedure, which associated with moderate to severe pain, preemptive administration of analgesic medication has been found to greatly reduce post-operative pain.

Keywords: COX- inhibitors, Pain, Tooth, Rescue therapy

Introduction

Preemptive analgesia is also known as preoperative analgesia is used to reduce or prevent the chemical mediators that cause nerve stimulation [1]. It is characterized as antinociceptive management that reduces or even prevents the changes induced by afferent nerves sensitization caused by tissue damage as a result of surgical procedure [2].

Surgical extraction of the tooth causes pain for the patient and should be reduced by using an analgesic drug [3]. Within a few hours after the surgical removal of the tooth, the pain starts and it should be managed by analgesics. Usually, the pain after these procedures are moderate to severe in intensity in the next 24 hours and peaks in three to six hours after the local anesthetic agent is used [4]. Surgical extraction of the tooth is usually associated with trauma for soft and hard tissues and usually associated with swelling and pain [5].

Tissue injury causes the release of chemical mediators like histamine, serotonin, kinins, and prostaglandins which cause the onset of pain and inflammatory process. Although inflammatory response is essential for the tissue repair process, when the response is intense the influence may be negative. So it is very important to keep the inflammatory response under control to encourage healing with minimum discomfort for the patients [6].

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Many medications may be used as pain relief after surgical tooth extraction and Nonsteroidal anti-inflammatory drugs (NSAIDs) are an option. By the administration of pre-operative analgesia, the intensity of postoperative pain may be decreased and delayed as a result of the reduction in the quantities of prostaglandins (PGs), a pain trigger, released to the site of injuries [7]. The accumulation of the pain mediators released from traumatic tissue increases with time leading to increases in pain intensity [8]. Since dental pain is mostly inflammatory, NSAIDs are the best analgesia for dental pain [9].

From a pharmacological point of view, NSAIDs have anti-inflammatory, analgesic, and antipyretic effects that resulted from their ability to inhibit cyclo-oxygenase (COX) enzyme which is important in the conversion of arachidonic acid (ARA) to PGs, hence responsible for Pain, inflammation, and increase in body temperature [10].

One of the most commonly prescribed Nonsteroidal anti-inflammatory drugs is Naproxen which has anti-inflammatory, analgesic, and antipyretic effects [11-14]. Naproxen is efficient in managing acute and chronic pain as well as treating inflammatory conditions. It has a good analgesic effect after dental extraction [15].

Another drug that is commonly prescribed as a pain reliever and antipyretic is Paracetamol, which is available as over-the-counter [16].

Paracetamol is widely used for inflammatory pain, but it has a weak anti-inflammatory effect, though it inhibits Cox2 enzyme (in the brain) it does not belong to Non-steroidal anti-inflammatory drugs, and it is classified as a mild analgesic. However, it has anti-pyretic and analgesic effects similar to Nonsteroidal anti-inflammatory drugs [17]. We aimed to compare the efficacy of Naproxen and Paracetamol as preemptive analgesia following surgical tooth extraction.

Materials and Methods

This randomized, double-blind, parallel, study was conducted in a private dental clinic. The participants signed a free and informed consent form. All participants (n = 40; both genders; 20–29 years old) were indicated for extraction of a tooth. Patients with chronic illnesses, allergic to drugs used in the study, pregnant or lactating participants, smoker or patients used analgesia one week before the surgery were excluded. All the 40 participants were randomized into two groups (Group A and Group B) each group has 20 participants, they double-blindly received single oral doses of naproxen mg or paracetamol 1 gm 60 min before the extraction, and the doses were packed in an envelope and coded by numbers for later identification

Assessments

A 10 cm visual analog scale (VAS) is used for assessment of pain, the scale is of intervals ranging from 0, which represents no pain, to 10 cm, which represents maximum pain.

The assessment was done by using the visual analog scale at 15 minutes, one hour, three hours, and six hours after the extraction. All participants were given a copy of the visual analog scale to assess the pain after one hour, three hours, and six hours. They were instructed to administer rescue analgesia at least six hours apart.

The number of patients and the time the first dose of rescue analgesia was taken were recorded. Pain intensity for each patient was recorded and analyzed to assess the analgesic effect of both medications. The data was collected and tabulated using Microsoft excel. Statistical analysis and data management were accomplished by using the statistical package for social sciences (SPSS) software.

Results and Discussion

Forty participants were randomly selected for the study. Participants who were given Naproxen have shown a higher analgesic effect compared to Paracetamol (1000mg). Participants that took the first rescue analgesic dose after 3 hours are more in the Paracetamol group. While those who took the first rescue analgesia dose at 5 hours are more in the Naproxen group, as illustrated in **Table 1** and **Figure 2**.

The intensity of pain after extraction was more in those who received Paracetamol. At time intervals of 15 min and one hour is no significant differences in pain intensity in both groups. At intervals from three to five hours, the intensity of the pain was higher in participants who were given Paracetamol compared to those given Naproxen (**Figure 1**).

Table 1. Mean value and standard deviation (SD) for pain intensity of participants following Naproxen and Paracetamol

	Paracetamol	Naproxen	p-value
Number	20	20	-
15 minutes	3.4 ± 1.2	3.1 ± 1.0	0.397
1 hours	5.4 ± 1.5	4.7 ± 1.1	0.087
3 hours	7.3 ± 1.8	5.2 ± 1.3	<0.001 [S]
6 hours	5.1 ± 1.1	4.4 ± 1.2	0.058

Data presented as mean ± standard deviation

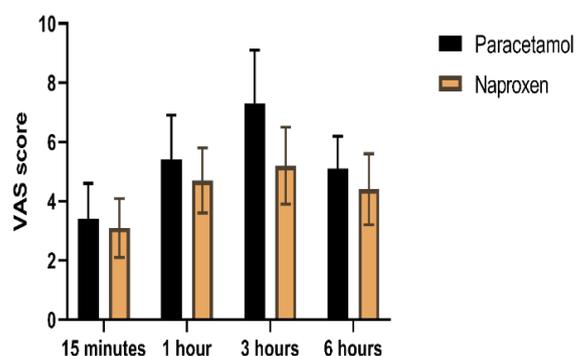


Figure 1. assessment of VAS score

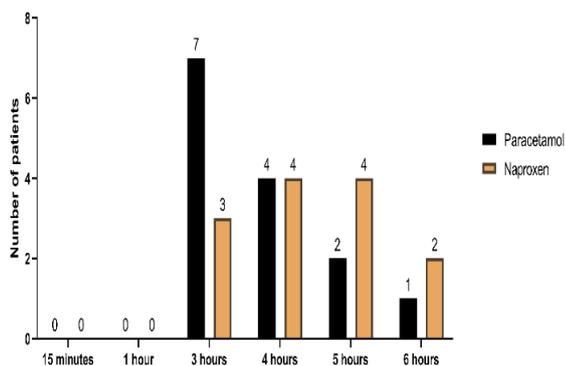


Figure 2. assessment of the number of patients required rescue analgesia

This study shows that the pre-operative administration of Naproxen is more effective in controlling pain after surgical extraction of the teeth than that of Paracetamol, and Naproxen shows a longer duration of analgesic effect. Also, the number of patients administered a rescue dose was less in the Naproxen group. According to the visual analog scale scores, the Naproxen group shows a lower pain intensity than participants who received paracetamol.

After a painful stimulus, there is a tremendous of mediators released that cause the pain, NSAIDs inhibits the degradation of phospholipid of the affected cell membrane that is responsible for both analgesia and inflammatory response [18].

It is important to use preemptive medication which lowers the initial production of pain mediators produced after tissue injury. Naproxen belongs to non-steroidal anti-inflammatory drugs, it is completely absorbed following oral administration with the bioavailability of 95%, and plasma levels are detected after 30 minutes of administration, with an elimination half-life of 15 hours [19].

Both groups showed relatively similar pain scores throughout the first operation. This could be explained by the remaining effect of the anesthetic drug. Development of post-operative pain over 6 hours for the two groups showed that mean pain score is highest at 3 hours after surgery, this can be explained by the end of anesthetic effect and high nociceptive effect due to short period after the surgery which led to a high concentration of pain mediators responsible for local nerve sensitization.

In comparison between the numbers of doses of rescue medication consumed by both groups during the study, it is found that patients of the Paracetamol group consumed more rescue medications than the Naproxen group. This is because of the higher level of pain experienced by the Paracetamol group.

Conclusion

In dental clinics, teeth extraction has become a routine procedure, which associated with moderate to severe pain, preemptive administration of analgesic medication has been found to greatly reduce post-operative pain.

In this study, two medications were evaluated as a preemptive analgesic and it showed that Naproxen is more effective than Paracetamol.

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Conflict of interest: None

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Ethics statement: The study was done in accordance with Helsinki declaration for medical research, and approved by Al Farahidi University (AF120214).

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