

RESEARCH ARTICLE

Analgesic Efficacy of Paracetamol Vs Ketorolac after Dental Extractions

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ABSTRACT:

Objective: To evaluate the analgesic efficacy of paracetamol(500mg) and ketorolac(10mg) after dental extractions. **Methods:** A prospective study was conducted during the academic year September-November 2017, randomly among 20 dental patients who visited the outpatient Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Saveetha University, Chennai, for single tooth extraction. 20 patients were randomized into two treatment groups (each with 10 patients), group A received Paracetamol 500 mg orally and group B received Ketorolac 10 mg orally immediately after dental extraction procedure. Pain intensity levels of patients were measured using the visual Analog scale (VAS) at different time intervals and compared between the two groups. Data collected were analyzed with Statistical Package for Social Sciences for Windows, Version 16.0 (SPSS Inc., Chicago, IL, USA) and results obtained. **Results:** Patients who received Ketorolac had lower pain intensity compared with patients who received Paracetamol. The duration of analgesia was longer in the Ketorolac group when compared with the Paracetamol group. There was a statistically significant difference in pain scores between ketorolac and paracetamol groups at $p < 0.05$. **Conclusion:** Ketorolac 10 mg is more effective than Paracetamol 500mg as an analgesic after dental extractions.

KEYWORDS: Paracetamol, Dental fear, Dental treatment, Dental extractions, Pain, Analgesia, Ketorolac

INTRODUCTION:

Dental extraction is the most common procedure carried out by dentists, and it is a common model for evaluating the efficacy of analgesics for acute dental pain relief.¹ It is often associated with swelling, pain, and trismus.² The pain of tooth extraction is likely to be one of the most severe pain that an individual experiences during his or her life.³ Many individuals rate the pain of tooth extraction as very severe or intolerable. The pain of tooth extraction varies among individuals, and each extraction of an individual may be quite different. Management of post-extraction pain and suffering, leads to earlier mobilization, shortened hospital stay, reduced hospital costs and increased patient satisfaction.⁴⁻⁶

Pain associated with surgical removal of teeth ranges between moderate and severe during the first 24 hours after surgery, with the major pain intensity occurring between 6 and 8 hours when a conventional local anaesthetic is used.⁷

Dental pain is largely inflammatory, and evidence based medicine has shown that non-steroidal anti-inflammatory drugs (NSAIDs) are the best analgesics for dental pain.⁸ The analgesic, anti-inflammatory, and antipyretic effects of NSAIDs are a result of the ability of these agents to inhibit cyclo-oxygenase (COX) enzymes, which catalyze the conversion of arachidonic acid to prostaglandins, which are fatty acids involved in the generation of pain, fever, and inflammation.⁹ Ketorolac is a proven and commonly prescribed NSAID with analgesic, anti-inflammatory, and antipyretic properties. It has been shown to be effective in treating a variety of acute and chronic pain and inflammatory conditions.¹⁰ Ketorolac has been used widely in pain control and has good analgesic effectiveness after

extraction. Ketorolac exerts its action via inhibition of prostaglandin synthesis by inhibiting COX-1 and COX-2 with relative equi-potency.¹¹

Paracetamol also known as acetaminophenol or APAP, chemically named N-acetyl-p-aminophenol, is a widely used over-the-counter analgesic and antipyretic. Paracetamol is classified as a mild analgesic. Combined with opioid analgesics, paracetamol can also be used in the management of more severe pain such as post-surgical and cancer pain. Though paracetamol is used to treat inflammatory pain, it is not generally classified as an NSAID because it exhibits only weak anti-inflammatory activity.^{12,13} The main mechanism proposed is the inhibition of cyclooxygenase (COX), and recent findings suggest that it is highly selective for COX-2. Because of its selectivity for COX-2, it does not significantly inhibit the production of the pro-clotting thromboxanes. Although it has analgesic and antipyretic properties comparable to those of aspirin or other NSAIDs, its peripheral anti-inflammatory activity is usually limited by several factors, one of which is the high level of peroxides present in inflammatory lesions.^{14,15}

The main concern of the dentist for their patients is to minimize the experience of pain and its consequences after dental extractions. A significant reduction in pain intensity levels after dental extraction will result in rapid post-operative recovery and satisfactory outcomes. Various NSAIDs have been tried to achieve this goal. Though paracetamol is the commonly used drug after dental extractions, recent literature describes that ketorolac is more efficient in the management of post-extraction pain.^{9,11} Thus, the purpose of the present study was to assess the efficacy of ketorolac and

paracetamol in pain control after dental extractions among the patients who were treated in our institution.

METHODS:

A prospective study was conducted during the academic year September-November 2017 among the dental patients who visited the outpatient department of oral and maxillofacial surgery, Saveetha Dental College, Saveetha University, Chennai. This study was conducted after obtaining approval from the ethical committee of our institution (SU/IEC/2017). Our study was conducted randomly on 20 healthy patients, who required single tooth extraction for various reasons such as pulpitis, periodontal disease, grossly decayed and fractured teeth. Medically compromised patients, patients allergic to NSAIDs, patients who had contra-indications to receive NSAIDs and those who were not willing to participate in the study were excluded from the study. Demographic details of the patients such as age, sex, occupation, and educational qualification were recorded.

Teeth were extracted under local anaesthesia only without any premedication or sedation, by a single dentist on all the patients. All procedures were done without any surgical complications. 20 patients were randomized into two treatment groups (each with 10 patients), group A received Paracetamol 500 mg orally and group B received Ketorolac 10 mg orally immediately after dental extraction procedure. Antibiotic (Amoxycillin 500mg thrice daily for three days) was prescribed for all the patients. For each patient, pain intensity levels were measured using questionnaires- the Visual Analog Scale (VAS) (Figure 1) with the help of patients.

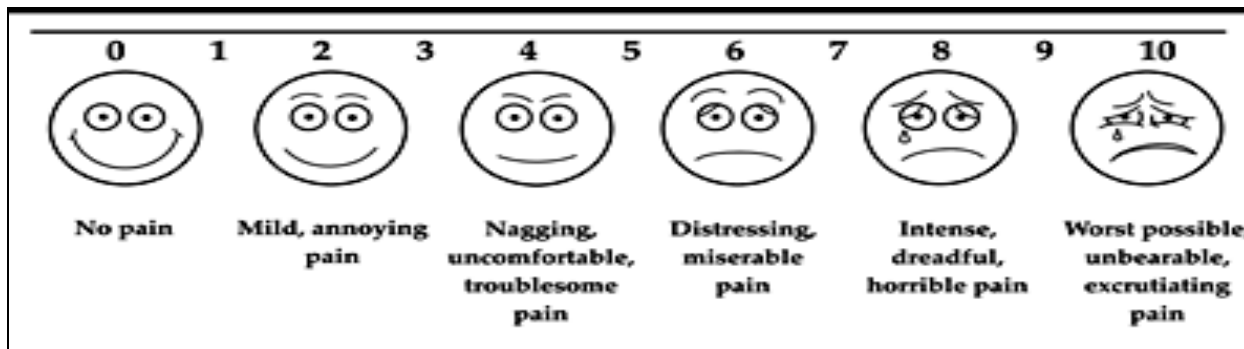


Fig 1. Visual Analog Scale (VAS)

Pain intensity levels were measured after the surgery in the following different time intervals. The durations of analgesia and pain intensity were recorded at the time interval of 10 minutes, 1 hour, 3 hours, and 6 hours after the extraction procedure. The duration of analgesia of the administered drugs after surgery was evaluated as

the time from the end of the surgery until the intake of the first rescue analgesic medication, which became necessary for the patient. The duration at which the rescue analgesic medication was taken is recorded. The patient was instructed to take the rescue analgesic medication at least 6 hours apart.

Data collected were analyzed with Statistical Package for Social Sciences for Windows, Version 16.0 (SPSS Inc., Chicago, IL, USA) and results obtained. To describe the data descriptive statistics, the mean and standard deviation for continuous variables were used. To find the significance in data, Students 't' Test was used with the probability value $p < 0.05$ as statistically significant level.

RESULTS:

In our study, 20 patients (9 males and 11 females) in the age range of 20-55 years participated and underwent single tooth extractions. Patients' pain intensity and the intake of rescue medication were recorded and analysed to evaluate the analgesic effect of each drug. Various data were compiled and pain scores calculated. Table 1 shows descriptive statistics for pain levels. Gender differences had no relationship with the pain intensity levels.

The pain levels between the two groups of patients after dental extractions as indicated by the VAS scores were evaluated by the students 't' Test. There was a statistically significant difference in pain scores between paracetamol and ketorolac groups at $p < 0.05$. The results showed the pain levels were lower in ketorolac group compared to paracetamol group. Pain scores between paracetamol and ketorolac groups in different time intervals are shown in figure 2. The duration of analgesia was longer in the Ketorolac group when compared with the Paracetamol group.

Table 1. Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean	P Value
10 minutes	Paracetamol	10	3.81	.632	.202	0.71
	Ketorolac	10	3.70	.675	.211	
1 hour	Paracetamol	10	5.32	.677	.211	0.009*
	Ketorolac	10	4.43	.689	.231	
3 hours	Paracetamol	10	7.40	.717	.214	< 0.0001*
	Ketorolac	10	5.60	.412	.143	
6 hours	Paracetamol	10	5.20	.412	.133	0.0006*
	Ketorolac	10	4.30	.548	.182	

*Statistically significant at $p < 0.05$

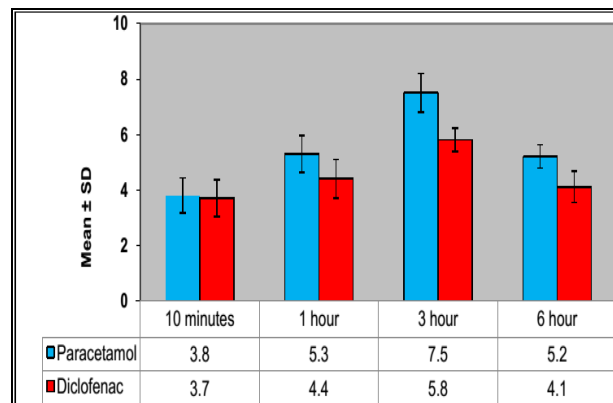


Fig 2. Pain scores between paracetamol and ketorolac groups in different time intervals

DISCUSSION:

This study shows that the administration of ketorolac is more effective than paracetamol in the control of pain after dental extraction. The mean duration of analgesia obtained was longer in patients who received ketorolac compared with those who received paracetamol drug. Ketorolac provides effective postoperative analgesia when administered either orally or parenterally.¹⁶ Preliminary studies suggested that oral ketorolac possesses potent analgesic activity in the postoperative period.¹⁷ When ketorolac was administered in an intravenous-oral sequence after ambulatory surgery, it produced fewer side effects than the combination of 600mg acetaminophen and 60mg codeine.¹⁸

Non-steroidal anti-inflammatory drugs (NSAIDs) have been used for more than 25 years to treat Rheumatological diseases. They were then introduced to relieve pain after tooth extraction and to provide post-operative analgesia.¹⁹ When used alone, they are effective in relieving mild to moderate pain such as that seen after maxillofacial, minor orthopaedic or some ambulatory surgical procedures and postpartum pain. NSAIDs have additional anti-inflammatory activity that is lacking in Opioids, which plays an important role in relieving post-operative pain and inflammation.²⁰

Ketorolac is an effective analgesic for treating moderate or severe postoperative pain. A rank order of the efficacy of different analgesic compared with paracetamol exists which allows comparison between different analgesics. This has been published previously in its entirety²¹ and for third molar extraction studies only. This rank order shows that ketorolac has a lower score (better) when compared to paracetamol. Its efficacy is comparable to that of other NSAIDs, for example ibuprofen and diclofenac.²²

Postoperative patients do usually develop fever for a number of reasons; some related to the anaesthetic techniques and surgical handling, others due to infective complications.²³ Ketorolac also has anti-pyretic properties and would have acted to reduce the number of participants experiencing fever. Thus it would be misleading to look for fever as an adverse effect.²⁴

Forbes et al.²⁵ reported better analgesia and a decrease incidence of side effects with ketorolac 10 mg compared with codeine 60 mg plus acetaminophen 600 mg, aspirin 650mg in post operative oral surgical application. Wong et al.¹⁸ reported Ketorolac, when used in an IV and then oral sequence is a safe and effective analgesic in the ambulatory surgery setting. Ketorolac does not depress central respiratory drive²⁶ or produce adverse effects on gastrointestinal function.²⁷ Also in a study, when compared to the paracetamol 500mg group, a lower

incidence of nausea and somnolence was also reported in the patients receiving ketorolac 10 mg. Several studies have reported the adverse drug reactions and interactions of NSAIDs in medical and dental practice.²⁸⁻³⁷

Several studies have compared the efficacy of oral formulations of paracetamol and ketorolac for surgical procedures.³⁸⁻⁴¹ McQuay et al.⁴² reported that 1 gram of oral acetaminophen was similar to 10-20 mg of ketorolac taken orally for pain relief after orthopaedic surgery. Zhou et al.⁴³ reported that 2 g of propacetamol (prodrug of paracetamol) has a shorter analgesic onset time than 15 mg or 30 mg of ketorolac in patients after total knee or hip replacement surgery (8 minutes with 2 g of propacetamol and 14 and 10 minutes in 15 mg and 30 mg of ketorolac, respectively).

Varrassi et al.⁴⁴ reported that 2 g of propacetamol showed a similar analgesic effect to that of 30 mg of ketorolac in a gynecological operation.

In our study, Patients given ketorolac had lower pain intensity and a longer time of analgesia compared to patients administered paracetamol after dental extractions. From the results of this study, it is clearly evident that patients who received ketorolac had less dental pain when compared to the paracetamol group. This will help clinicians in prescribing analgesics after dental extractions. ketorolac is better compared to paracetamol as an analgesic after dental extractions.

CONCLUSION:

Ketorolac 10 mg is more effective than Paracetamol 500mg as an analgesic after dental extractions.

CONFLICT OF INTEREST:

The authors declare no conflict of interest.

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