

Comparative study of tramadol and ketorolac in the pain management of third molar tooth extraction

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Abstract

Objective: Clinical comparison of efficacy, duration of action, onset of action, side effects of two most commonly used analgesics tramadol and ketorolac after the third molar tooth extraction.

Materials and methods: The present study was carried out at department of oral surgery, Mamata Dental Hospital, Khammam, India. 150 patients were randomly selected and divided into two groups. Group A received 50 mg of tramadol orally and Group B received 10 mg of ketorolac orally. In both groups dose was repeated for next 24 hrs. Visual scale analog was used for the collection of pain intensity from the patients.

Results: In Group A, the analgesia started within 1 hour and at the end of 24 hours, pain intensity was 2.12 out of 10 on visual analog scale. In Group B, analgesia started within 30 mins and at the end of 24 hours, the pain intensity was 2.98 on visual analog scale. Sedation associated with dizziness and muscle relaxation was observed with tramadol in 5% of patients and sweating in 8% patients. While in case of ketorolac, 33% of patients suffered with side effects. Among them 33% patients suffered with bleeding at the site of tooth extraction and 20% patients suffered with epigastric pain. The analgesic effect of 50 mg tramadol lasted up to 6 hours and that of ketorolac lasted for 5 hour.

Conclusion: The study shows that tramadol is a suitable and safe analgesic for the relief of post-extraction pain and is more effective than ketorolac with prolonged analgesia and minimal side effects.

Key Words: Tramadol, ketorolac, third molar tooth extraction,

Introduction

The wisdom tooth (or third molar) is usually the last tooth to erupt into the mouth anytime after about 16 years of age. Frequently, there is not enough room

in the mouth to accommodate the erupting wisdom teeth and therefore, they might not always come into the mouth normally. Wisdom teeth are usually either impacted forwards into the tooth in front or backwards into the jaw bone. An impacted wisdom tooth causes infection in the gum surrounding the tooth leading to

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pain and swelling. Sometimes cysts also formed due to impacted wisdom tooth. To avoid these problems it is always better to remove the tooth. However, the management of pain consequent to tooth extraction is always a major concern for the individual.^{1,2}

The way pain is experienced is a reflection of the individual's emotional, motivational, cognitive, social, and cultural circumstances. The pain of tooth extraction is likely to be 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 relieves suffering and leads to earlier mobilization, shortened hospital stay, reduced hospital costs and increased patient satisfaction.^{4,5,6}

Tramadol is an atypical centrally-acting analgesic because of its combined effects as an opioid agonist and a serotonin and noradrenaline reuptake inhibitor. The risk of respiratory depression is significantly lower at equianalgesic doses and does not depress the hypoxic ventilatory response. It has limited effects on gastrointestinal motor function. Nausea and vomiting are the most common side effects and tramadol does not increase seizure incidence when compared to other analgesic agents. Tramadol has been used clinically and evaluated during the past 20 years with broad indications leading to its widespread use.⁷

Ketorolac tromethamine is a member of the pyrrolo-pyrrole group of nonsteroidal anti-inflammatory drugs (NSAIDs) which was previously reported for the short term management of moderate to severe pain. The primary molecular basis for anti-inflammatory, antipyretic and analgesic effects of

Ketorolac is the inhibition of prostaglandin synthesis by competitive blocking of the enzyme cyclooxygenase (COX).

The present study was conducted keeping in view giving the quicker, prolonged and safer post-extraction analgesic after third molar tooth extraction for quicker recovery of the patient from the post-extraction pain. This study was the clinical comparison of efficacy, safety and patient satisfaction of clinically widely used analgesics, tramadol and ketorolac. There were some reports published comparing the parenteral tramadol and ketorolac in maxillofacial surgery.^{8,9}

Materials and methods

One hundred and fifty patients from routine admissions with tooth extraction were selected randomly during the period of 10 months from July 2008 to April 2009 in the department of oral surgery, Mamata Dental Hospital affiliated to Mamata Dental College, Khammam, India. The inclusion criteria were: age in between 18 to 60, undergoing into third molar tooth extraction, alertness and stability. The exclusion criteria were: history of drug or substance abuse, allergy to opioids or any other contraindication for the use of opioids, end stage renal disease, history of seizure or any abnormal laboratory tests that could interfere with our results.

The methodology and procedure of study had been cleared by the ethical committee and clinical research review committee, Mamata Dental College. All the individuals were well informed about the study, methodology and also about the visual analog scale prior to tooth extraction. The individuals were unaware of the analgesic which they had taken during the study. The drugs ketorolac and tramadol were

procured from the hospital pharmacy and they have been assigned a code. Patients were randomly assigned in either treatment groups with an assigned code.

The patients were divided into two groups containing 75 patients in each group. All the codes of administered drugs were disclosed only after the pain assessment. The group 'A' received tramadol 50mg oral dose before the extraction and dose repeated after 6 hours. The group 'B' received ketorolac 10mg oral dose before the extraction and dose was repeated after 6hrs. Pain assessment was done by verbal rating using Visual Analog Scale.^{10,11} [**0 – no pain, 2 - mild pain, 4 - tolerable, 6 – distressful pain, 8 – severe pain and 10 – totally disabling pain**]. The pain assessment was started after the tooth extraction at time points of 30 min, 1, 2, 3, 4, 5, 6, 12, 18 and 24 hrs. The patient's vital signs including heart rate, respiratory rate and blood pressure were recorded at every time point after the assessment of pain intensity. Statistical analyses were performed using *Chi-square* test.

Results

The majority of the patients scored an average pain intensity of '8.07' on visual analog scale as the maximum pain felt by them in their life time. The analgesic effect for group 'A' who were taken tramadol started within 1st hour and reached the maximum analgesic effect in 3 hours. The average rating of pain intensity is '1.12' on visual analog scale for the maximum analgesic effect felt at 3rd hour and with the first dose the analgesic effect sustained for 6 hours. The analgesic effect of tramadol has been increased for every six hours and at the end of the 24 hours, the patients scored the pain intensity of '2.12' on visual analog scale.

The analgesic effect for group 'B' who were taken ketorolac started within 30 mins and showed its's maximum analgesic effect in 1st hour itself. The pain intensity scored on visual analog is 2.45 at 1st hour. But the effect was not sustained till the next dose. The patients felt the pain in the 5th hour itself. The patients scored '6.94' in 5th hour and '7.34' in 6th hour on visual analog scale. After the second dose, the pain intensity was observed for every 6 hrs. At the end of 24 hours, the patient scored '2.98' on visual analog scale. The 'p' values were less than 0.05 and were considered statistically significant (Table 1).

According the observations, the analgesic effect is reached quickly in group 'B' who received ketorolac. However, the duration of analgesia is more in group 'A' patients who received tramadol (Figure 1). Many patients in group who received ketorolac complained of pain before the dosing schedule time i.e. 6 hours.

The adverse effects in group 'A' who took tramadol were minimum and they were shown only in 8% of the patients. Major adverse effects seen in this group are sweating (8%), sedation (5%) and decrease in blood pressure (4%). But in group 'B' who were on ketorolac, adverse effects were observed in 33% patients. 33% patients reported the bleeding at the extraction site and 20% patients reported the epigastric pain. The intensity of adverse effects here increased as dose increased. With the first dose of ketorolac, only 8% patients reported both epigastric pain and the bleeding at the extraction site. (Table 2)

Discussion

Inspite of the spectacular advances in modern medicine, no single drug satisfied all the criteria of an ideal post extraction analgesic. Post extraction analgesia can increase the patients comfort, decrease

the pain and stress after tooth extraction. The present study was designed to assess and compare the efficacy, safety and the patient satisfaction of two most commonly clinically used analgesics tramadol and ketorolac. Tramadol is a newer opioid with better analgesic action without the risk of development of tolerance and physical dependence. Now it has been using very commonly for chronic pain. From the literature it has been considered as safest postoperative analgesic.^{5,12} Ketorolac is a most commonly used NSAID for the short term management of pain. Main focus was on the study of pain intensity and the adverse effects of both the commonly used analgesics, tramadol and ketorolac. Safety of therapy was based on the frequency of side effects and evolution of vital signs recorded during the study. From the current study it has been proved that both the drugs are giving better analgesic effect. Ketorolac is showing its analgesic effect very rapidly but the action sustained only up to 4 hours (Figure 1). Where as tramadol's analgesic effect started after 1 hour and sustained for the longer time i.e. more than 6 hours (Figure 1). The patients who received ketorolac also reported severe adverse effects like epigastric pain, bleeding at the tooth extraction site, nausea and sweating. Tramadol had a bit marked effect on blood pressure and also caused sweating in few patients (Figure 2(a), 2(b), 2(c), 2(d)).

Conclusion

The overall study profile proved that tramadol is a suitable and safe analgesic with longer duration of action and less adverse effects for relief of post-extraction pain after third molar extraction and is more effective than ketorolac with a long sustained analgesic action. The percentage of side effects was minimal.

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Table 1: Comparison of Pain intensities of Tramadol and Penatazocine

Time intervals at which Pain intensity is measured	Tramadol Mean ± SD	Ketorolac Mean ± SD
Maximum Pain	8.07±0.12	8.07±0.12
1st Dose		
30 min	6.16±0.34	4.32±0.18
1 hr	3.75±0.56	2.45±0.48
2 hr	1.65±0.82	3.09±0.94
3 hr	1.12±0.34	3.93±0.71
4 hr	2.89±0.29	5.65±0.41
5 hr	4.16±0.73	6.94±0.47
6 hr	5.41±0.48	7.34±0.12
2nd Dose		
12 hr	3.89±0.72	4.12±0.53
3rd Dose		
18 hr	3.12±0.41	3.89±0.64
4th Dose		
24 hr	2.12±0.27	2.98±0.29
<i>P-Value < 0.05</i>		

Figure 1: Graphical representation – Comparison of pain intensities of Tramadol and Ketorolac

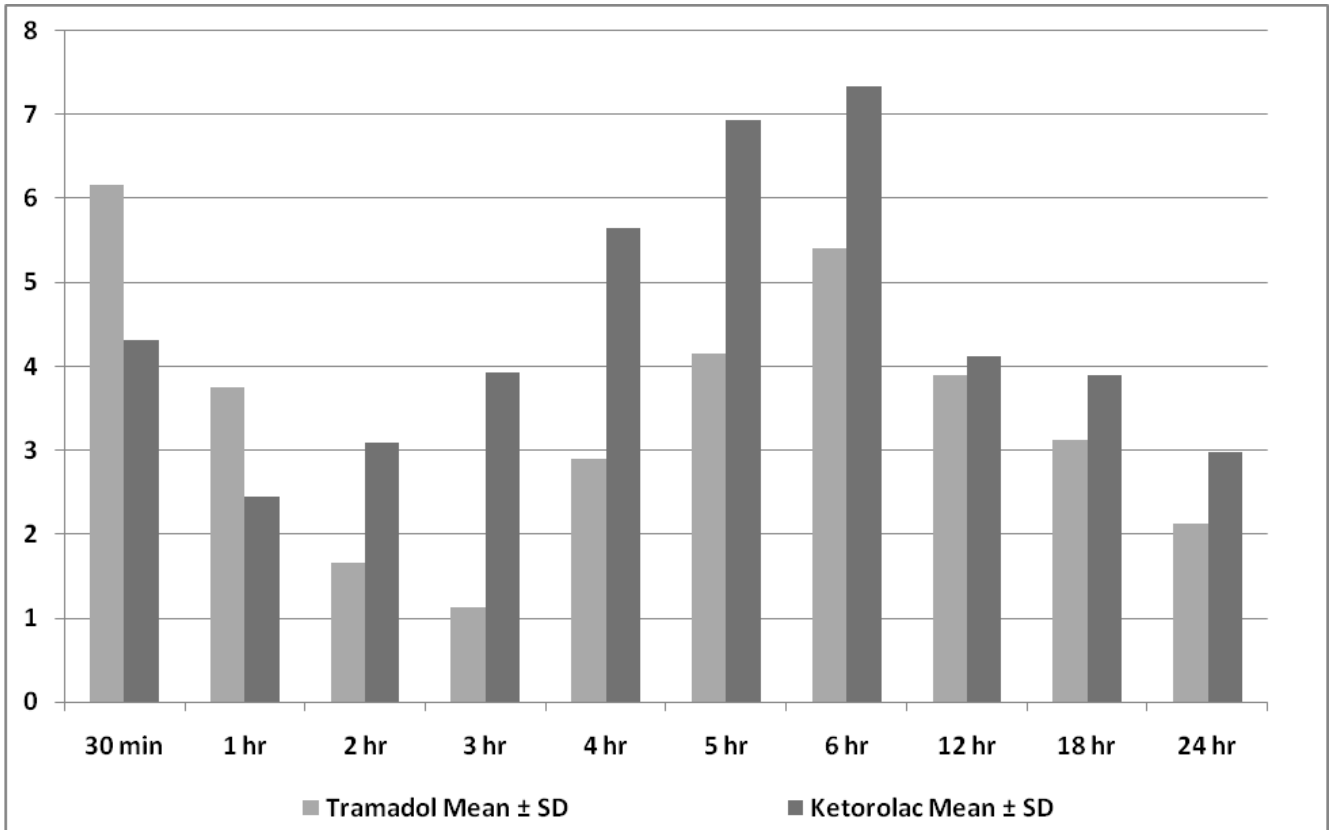


Table 2: Side effects distribution of Tramadol and Pentazocine

Adverse Effects	Tramadol		Ketorolac	
	No of patients with side effects*	Percentage (%)	No of patients with side effects*	Percentage (%)
<i>After 1st Dose</i>				
Sedation	2	2.67	0	0.00
Sweating	2	2.67	1	1.33
Bleeding at tooth extraction site	0	0.00	3	4.00
Nausea	0	0.00	1	1.33
Diarrhoea	0	0.00	1	1.33
Epigastric Pain	0	0.00	4	5.33
Decrease in B.P.	1	1.33	0	0.00
<i>After 2nd Dose</i>				
Sedation	3	4.00	0	0.00
Sweating	4	5.33	3	4.00
Bleeding at tooth extraction site	0	0.00	6	8.00
Nausea	2	2.67	3	4.00
Diarrhoea	1	1.33	2	2.67
Epigastric Pain	1	1.33	6	8.00
Decrease in B.P.	3	4.00	1	1.33
<i>3rd Dose</i>				
Sedation	4	5.33	0	0.00
Sweating	6	8.00	4	5.33
Bleeding at tooth extraction site	1	1.33	14	18.67
Nausea	2	2.67	6	8.00
Diarrhoea	1	1.33	2	2.67
Epigastric Pain	1	1.33	10	13.33
Decrease in B.P.	3	4.00	2	2.67
<i>4th Dose</i>				
Sedation	4	5.33	0	0.00
Sweating	6	8.00	5	6.67
Bleeding at tooth extraction site	1	1.33	25	33.33
Nausea	2	2.67	9	12.00
Diarrhoea	1	1.33	2	2.67
Epigastric Pain	1	1.33	15	20.00
Decrease in B.P.	3	4.00	3	4.00

P-Value < 0.05

** Each group contains total number of 75 patients*

Figure 2(a): Graphical representation – Comparison of Adverse effects of Tramadol and Ketorolac after 1st dose

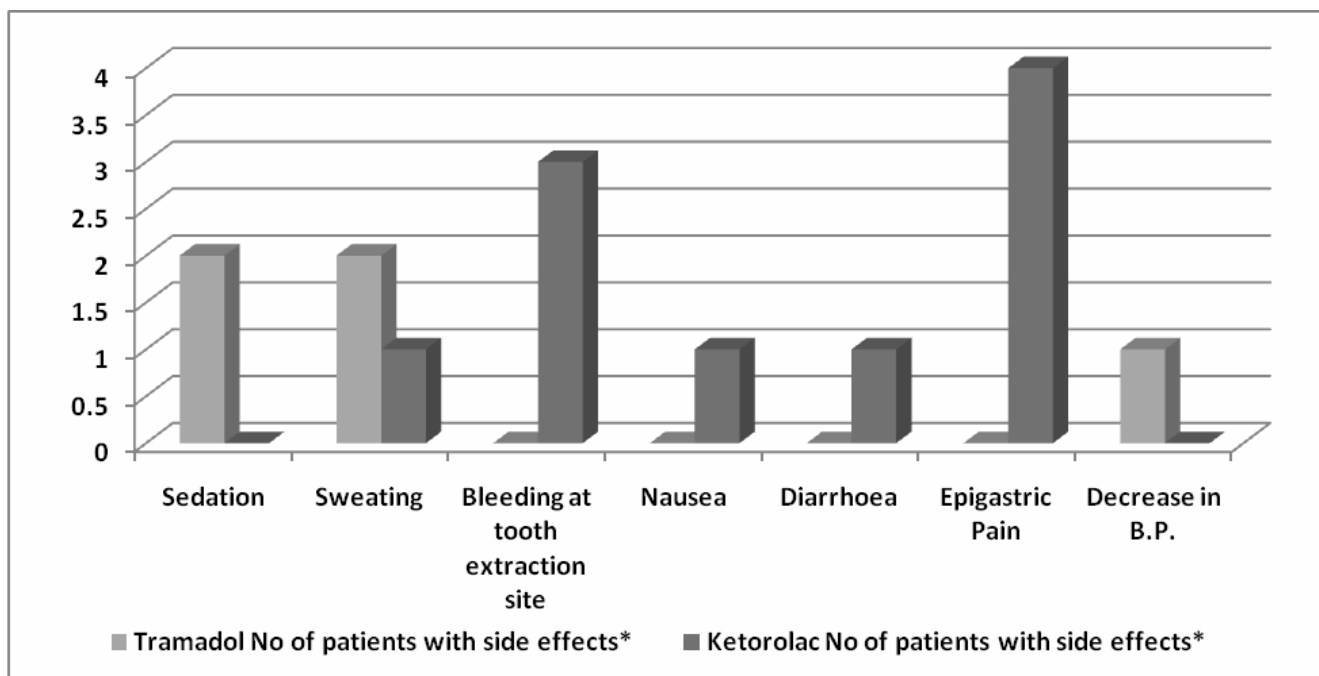
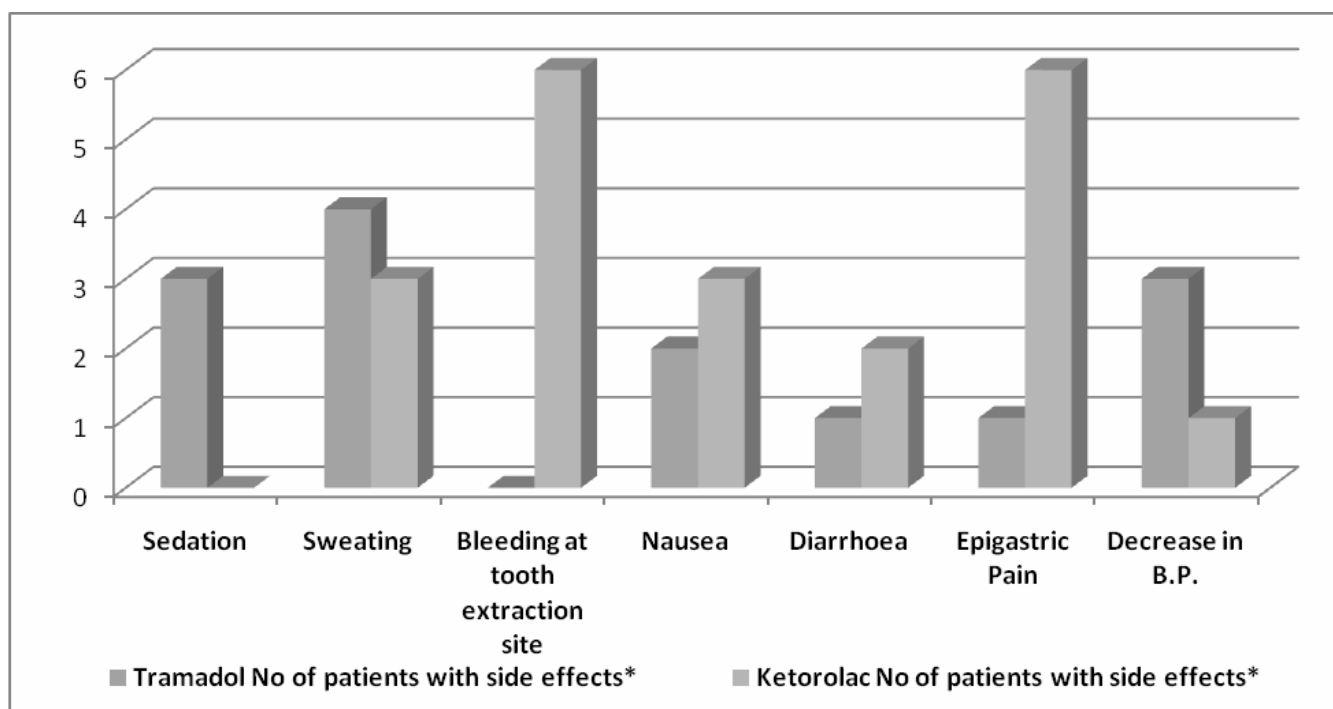


Figure 2(b): Graphical representation – Comparison of Adverse effects of Tramadol and Ketorolac after 2nd dose



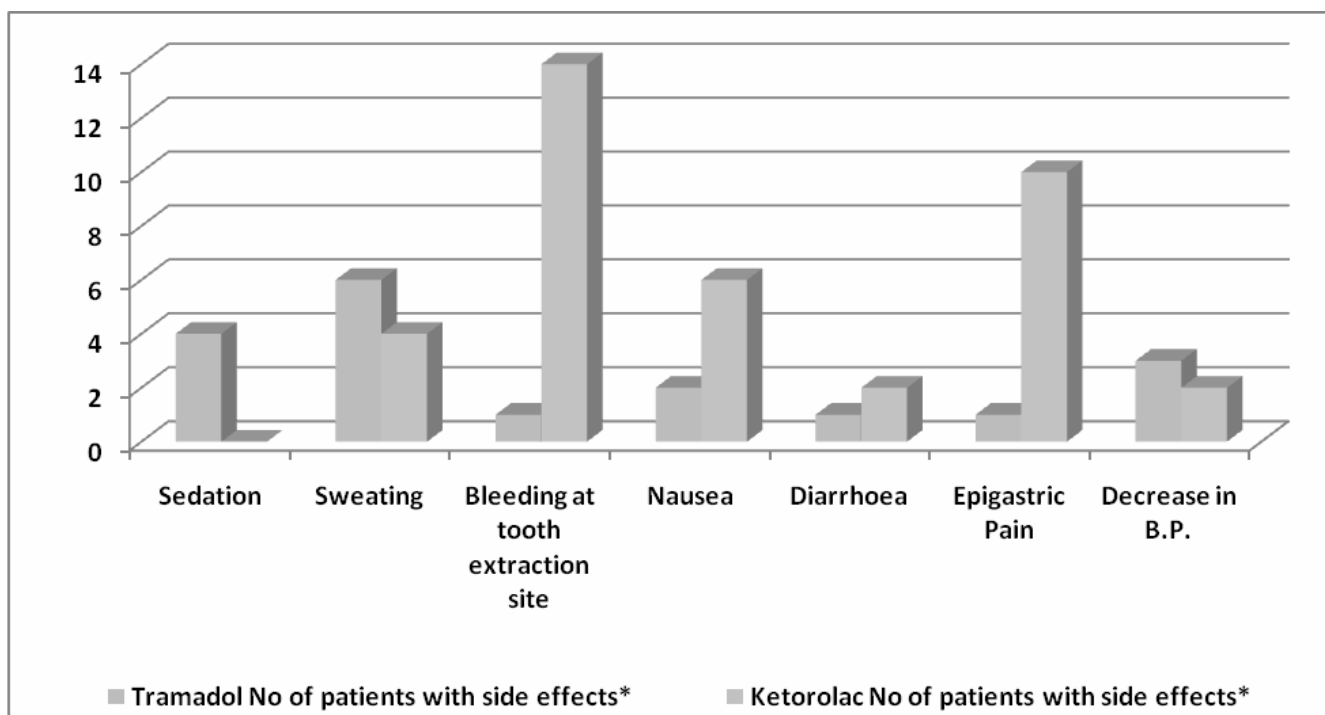


Figure 2(d): Graphical representation – Comparison of Adverse effects of Tramadol and Ketorolac after 4th dose

