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## Research Article

# DOES THE SUBLINGUAL ROUTE OF ADMINISTRATION OF PIROXICAM AFFECTS THE POSTEXTRACTION SEQUELAE OF CARIOUS MANDIBULAR MOLARS?: A RANDOMISED DOUBLE BLIND STUDY

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ABSTRACT

Extraction of carious molars is one of the most common & widely carried out procedure in general dental practice. There are certain post extraction complications such as pain & swelling which causes discomfort to the patient. Protocol for the management of this complication is administration of non steroidal anti-inflammatory drugs (NSAIDs).The present study evaluated the efficacy of 20mg sublingual piroxicam (Ugesic) vs 20mg oral piroxicam (Dolonex) .The present study comprised of 50 patients with bilaterally carious mandibular molars. Patients were divided into two groups [group 1 & group 2]. 20mg oral piroxicam was given to group1 patients and 20mg sublingual piroxicam was given to group 2 patients following extraction. Subjective evaluation was done using 10 point visual analog scale on 1st,3rd and 7th postoperative day. The present study showed comparable results when pain and gastric irritation were compared on 1st,3rd and 7th postoperative days. Need for rescue analgesic was found more in oral group as compared to sublingual group. It can be concluded that sublingual piroxicam 20mg has better efficacy & tolerability as compared to oral piroxicam 20mg in post extraction pain management.

**INTRODUCTION:**

Due to the fear of pain some patients remain away from dental clinic even in presence of severe tooth related problems. Introduction of local anesthetics in dentistry has reduced the phobia to some extent but still some patients fear about post extraction pain. Advancement in pharmacological science has led to introduction of effective analgesic and anti-inflammatory drugs like Non steroidal anti-inflammatory drugs[NSAIDs] which is used in reducing or controlling post extraction pain. Extraction of carious molars is one of the most common and widely carried out procedure in general dental practice. Difficulty in extraction and intensity of post extraction complication depends upon number of factors like dense supporting bone, difficult root morphology, host defense mechanism, type of healing, largely restored tooth, brittle tooth, endodontically treated tooth. Pain and swelling are the common sequelae of this procedure. The pain is due to histamine release from the injured tissues. Pain is an ill defined, unpleasant sensation usually evoked by internal or external noxious stimulus. International association for study of pain defined pain as "unpleasant sensory and emotional experience associated with actual or potential tissue damage''[1].

As pain is the most common undesirable effect of any surgical procedure and has been extensively studied so it is used as a parameter in evaluating the efficacy of many therapeutic approaches. Some type of treatment is always administered to tackle this pain such as application of external cold dressing, administration of NSAIDs. Use of NSAIDs is common among them. They act by inhibition of cyclooxygenase[COX] which in turn inhibits the synthesis of prostaglandin and reduce the inflammatory reaction and nociceptive stimuli causing reduction in pain.COX has three isoforms COX-1,COX-2 also known as prostaglandin-endoperoxide synthase2,COX-3(a COX-1 derived protein).

Different isoforms are expressed in different tissues like cox-1 is expressed in all tissues where as COX-2 is expressed in few tissues like renal medulla, prostate,brain and endothelium. COX-3 is found in cerebral cortex and heart. Isoenzyme COX-2 stimulates proinflammatory prostaglandin production[2,3,4,5]. But there are some undesirable effects of this drug like gastrointestinal irritation, inhibition of platelet aggregation and alteration in renal function[6]. Numerous studies have been done to evaluate the efficacy of oral analgesics like diclofenac,ibuprofen,meloxicam,ketorolac and piroxicam[7,8,9,10,11,12,13],piroxicam is a drug with potent anti-inflammatory, analgesic and antipyretics property and is most commonly used in rheumatic diseases. It has a long half life with elimination half life of 38hrs.The inactive metabolites get eliminated by hepatic metabolism and often ranges from 30-60hrs. Literature suggests that piroxicam 20mg daily is comparable with aspirin 3 to 6g,phenyl butazone 400mg,naproxen 500mg,ibuprofen 1200+2400mg and diclofenac 75mg in rheumatoid arthritis.

Piroxicam inhibits the secondary phase of platelet aggregation and synthesis of prostaglandins. After administering 20mg of piroxicam the peak plasma concentration is attained in 2hrs but may range from 1-6hrs in different patients. Plasma concentration increases in patients with severe liver insufficiency[14]. Piroxicam is available in oral as well as sublingual formulation. Oral mucosal lining is the preferred route due to its advantages over the other routes. In oral mucosa four regions shows drug absorption i) sublingual ii) gingival iii) buccal & iv) palatal.

The sublingual administration of the drug avoids the first passage of drug in liver, unlike oral administration which pass through the GIT causing disturbances. The advantages of sublingual route over the other parenteral and enteral route of drug delivery are due to its rich blood supply, rapid onset of action, enhanced bioavailability, avoidance of first pass and food effects, increased patient compliance, ease of self-medication and does not have any harmful effect in the oral cavity[14, 15].

## MATERIAL & METHODS

In this study, we have compared the efficacy of oral and sublingual piroxicam in management of postoperative pain, incidence of gastric irritation and need for rescue analgesic after removal of lower carious molars. The aim of this study was comparison of oral and sublingual piroxicam in post extraction pain management. The objectives of present study were to assess the efficacy of piroxicam given sublingually and orally for relief post-extraction pain, to assess the incidence of gastric irritation after administration of sublingual and oral piroxicam, to assess the need for rescue analgesic taken in oral as well as sublingual piroxicam group.

A prospective, randomized study was done on a clinical sequence of fifty patients which were between the age group of 18-50 years, who required to undergo extraction of carious mandibular molars reporting to the Department of Oral and Maxillofacial Surgery at Yogita Dental College and Hospital. Study population was divide into two groups Group 1 (25 patients): Oral Piroxicam Group & Group 2 (25 patients): Sublingual Piroxicam Group. The inclusion criteria were, patients who wanted to undergo extraction of carious lower molars, Patients willing to provide written informed consent to participate in the study.

The exclusion criteria were, medically compromised patients, patients allergic to piroxicam or any other NSAIDS, pregnant women, patients unwilling to participate in the study, patients on psychotropic drugs, subjects with history of blood dyscrasias, subjects with compromised immunity. Case history and consent of the patients were taken before starting the extraction of carious mandibular molars. Only one experienced surgeon performed all the extractions. Only one side of the jaw was operated at a time. All the patients received anesthetic blockade of inferior alveolar, lingual and buccal nerve.

When anesthesia was achieved removal of every molar followed a standard protocol. After extraction, each extraction site was thoroughly irrigated and the patient was given piroxicam orally or sublingual. Each patient remained unaware of how piroxicam would be administered after first extraction was completed. The NSAID administration protocol was one 20mg tablet of piroxicam given orally or one 20mg tablet of fast dissolving piroxicam given sublingually, twice daily for two days and once daily for next four days. Diclofenac sodium 50mg orally was administered as rescue analgesic and patients were instructed to record the date and time of its consumption. Patients were instructed not to interrupt the use of principle drug even after consuming rescue analgesic. After extraction patients were asked to score the pain on a 10-point visual analogue scale on 1$^{st}$, 3$^{rd}$ and 7$^{th}$ postoperative days. Incidence and severity of gastric irritation were recorded by each patient.

## RESULTS

In this study, there were 50 patients which were further subdivided into two groups [group 1-oral and group 2-sublingual]. All the 50 patients were recalled and the data was obtained from 50 patients who completed the study. The pain score was higher with statistical significant difference ($P<0.01$) in patients receiving oral piroxicam as compared to sublingual group on 1$^{st}$ and 3$^{rd}$ day but no great difference was found in pain scores on 7$^{th}$ postoperative day (Table 1& Graph 1). Incidence of gastric irritation was found higher in patients receiving oral piroxicam whereas not a single patient was found with gastric irritation receiving sublingual piroxicam. The need for rescue analgesic was higher (40 %) in oral group as compared to sublingual group (table 2 & graph 2). Hence sublingual route has better efficacy & tolerability as compared to oral in post extraction pain management.

*Table 1: Vas Pain Score Of Patients Receiving Oral Piroxicam In Comparison With Sublingual Group On 1st And 3rd & 7th Day*

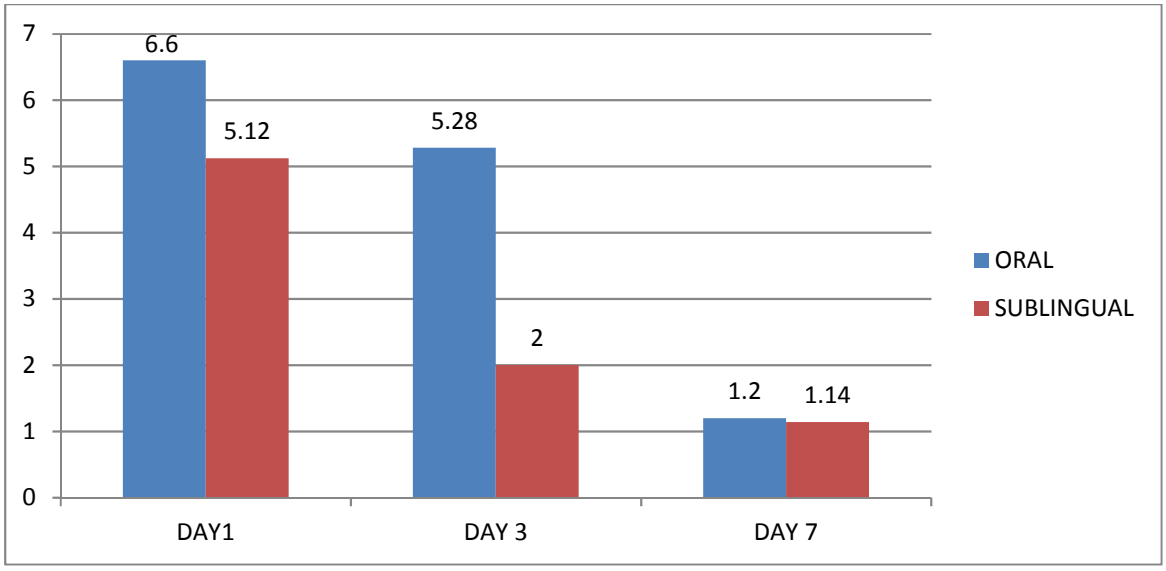
| GROUPS | DAY 1 | | DAY 3 | | DAY 7 | | DAY 1 CHANGES COMPARED WITH DAY 3 & 7 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | MEAN | STANDARD DEVIATION | MEAN | STANDARD DEVIATION | MEAN | STANDARD DEVIATION | DAY 3 | | DAY 7 | |
| | | | | | | | MEAN | SD | MEAN | SD |
| oral | 6.60 | 0.782 | 5.28 | 0.607 | 1.20 | 0.670 | 1.32 | 1.019 | 5.04 | 1.040 |
| sublingual | 5.12 | 0.594 | 2.00 | 0.571 | 1.14 | 0.639 | 3.12 | 0.872 | 3.98 | 0.869 |
| P value | **<0.001*** | | **<0.001*** | | 0.521* | | **<0.001*** | | **<0.001*** | |

*P<0.005*= Significant*

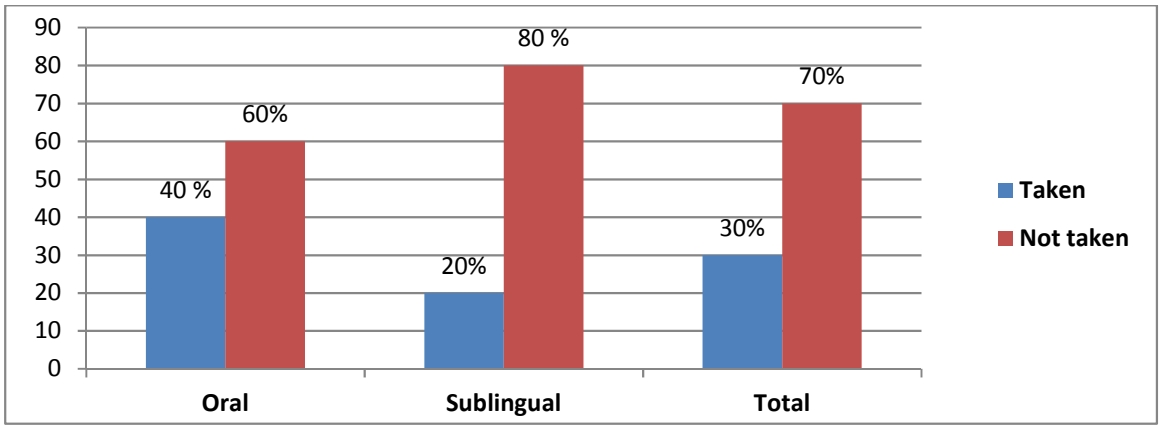
*Table 2: Comparison Of Oral & Sublingual Piroxicam With Need For Rescue Analgesic*

| Rescue analgesic taken | Oral | Percentage | Sublingual | Percentage | Total | Percentage |
|---|---|---|---|---|---|---|
| Taken | 20 | 40 | 10 | 20 | 30 | 30 |
| Not taken | 30 | 60 | 40 | 80 | 70 | 70 |
| Total | 50 | 100 | 50 | 100 | 100 | 100 |

*Graph 1: VAS Pain scores of oral and sublingual Piroxicam patients at Day 1st, 3rd & 7th.*




*Graph 2: Comparison of oral & sublingual piroxicam with rescue analgesics.*



## DISCUSSION

Postoperative pain and swelling are the main indicators of patient's discomfort and it depends on difficulty during the procedure and time taken to complete the procedure. In the present study pain was evaluated using 10-point visual analogue scale (VAS) on 1st, 3rd and 7th postoperative days. Sublingual drugs are more effective and faster acting as compared to oral ones because sublingually administered drugs are absorbed by oral mucosa and avoids gastrointestinal and hepatic degradation before entering into systemic circulation. For certain drugs oral, mucosal lining is the preferred route. Sublingual route is the preferred route as compared to enteral and parenteral because of its rich blood supply, Avoidance of first pass metabolism, fast onset of action, improved bioavailability and food effects. Piroxicam used in this study showed no serious adverse side effects[16].

According to Desjardins PJ[17] analgesic efficacy of piroxicam 20mg/40mg was significantly better than 5mg/10mg in management of postoperative dental pain and he also compared with aspirin 648mg and he concluded that piroxicam is more effective than aspirin, similar results was also seen with piroxicam in our study.

A review done by Edwards JE et al, suggests that single dose of piroxicam (20mg and 40mg) are effective for treating moderate to severe postoperative pain and compare satisfactorily with opoid analgesics such as dextropropoxyphene and tramadol and other NSAIDs[18].

NSAIDs including piroxicam shows some adverse effects. Some patients show allergic reaction to NSAIDs. Patients with increased risk for hepatic failure, peptic ulcers and gastrointestinal inflammation should stop using NSAIDs including piroxicam. It was stated in one data sheet that, approximately 30% of all patients receiving daily doses of 20mg of piroxicam experience side effects such as abdominal discomfort, flatulence, nausea, abdominal pain, epigastric distress. patients having history of allergic reactions to any analgesic drugs including NSAIDs were excluded from this study[19].

According to Phulgirkar SS & Balihallimath LJ[16,] need for rescue analgesic was higher in oral group as compared to sublingual group after extraction. The present study showed similar results with need for rescue analgesic higher in oral group (40%) as compared to sublingual group (20%).

According to Hirofumi matsui[21] et al, use of NSAIDs leads to gastiric irritation as well as ulcers which was also evident with present study who received oral piroxicam. The degree of postoperative pain depends upon degree of tissue damage and trauma. Reducing this pain is necessary not just for immediate reduction of postoperative morbidity but also to provide prolonged benefits by preventing further worsening of pathologic states. Understanding the pathophysiology of this pain is essential for its management[20].

A biochemical cascade gets activated after surgical trauma which releases prostaglandin, bradykinin, histamine, substance-p and other substances. They interact with each other leading to edema formation as well as excite and sensitize peripheral nerve endings causing hyperalgesia. They also stimulate release of neuropeptides from peripheral nerve endings participating in the other biochemical cascades. A positive feedback loop is formed by these substances which continues the inflammatory process[20].

## CONCLUSION

The study showed comparable results for both the formulations of piroxicam in post extraction pain management after removal of lower molars. The amount of rescue analgesic taken was in higher in oral group. Gastric irritation was also found more in oral group. To conclude, sublingual piroxicam was more efficacious in management of post extraction pain with least gastric irritation. Thus it can be used effectively to control pain after extraction of a tooth.

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