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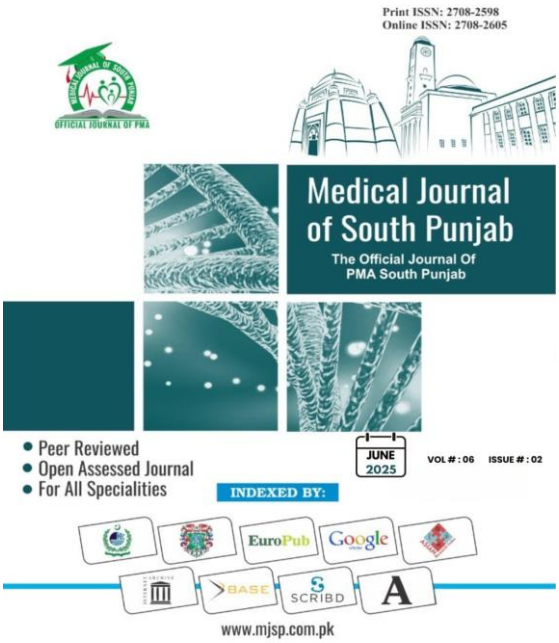

Comparison of Ibuprofen versus Celecoxib in post-extraction pain relief

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Comparison of ibuprofen versus celecoxib in post-extraction pain relief

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ABSTRACT

Objective: To compare mean pain score of celecoxib versus ibuprofen in post tooth extraction pain relief at a tertiary care hospital.

Methods: The study was Quasi experimental design conducted in the Department of Oral and Maxillofacial Surgery, Jinnah Postgraduate Medical Centre, over a period of six months from July 2024 to January 2025. A total of 78 patients undergoing tooth extraction were enrolled and randomly allocated into two groups, with 39 patients in each group receiving either ibuprofen or celecoxib postoperatively. Pain intensity was assessed using the Visual Analogue Scale (VAS) at predefined intervals over a 24-hour postoperative period. Demographic data, including age, gender, and smoking status, were recorded and analyzed.

Results: The mean age of participants was 34.9 ± 8.0 years, with a near-equal gender distribution (52.6% male, 47.4% female). Most participants (59.0%) were from rural areas, and 24.4% were smokers. At 24 hours postoperatively, the celecoxib group reported significantly lower mean VAS scores (2.23 ± 1.36) compared to the ibuprofen group (3.37 ± 2.14) ($p < 0.05$), demonstrating superior analgesic efficacy.

Conclusion: Celecoxib provided significantly better pain relief than ibuprofen following tooth extraction, suggesting that selective COX-2 inhibition may offer an effective and well-tolerated alternative for postoperative analgesia in dental procedures.

Keywords: Tooth Extraction. Ibuprofen, Celecoxib, Pain, VAS score

1. INTRODUCTION

Tooth extraction, particularly of impacted mandibular third molars, is among the most commonly performed oral and maxillofacial surgical procedures worldwide. Despite being routine, this procedure is often associated with significant postoperative discomfort, including pain, swelling, and trismus, which can affect patient satisfaction and recovery[1]. Effective pain management is therefore an essential component of postoperative care, as uncontrolled pain may hinder oral intake, delay healing, and negatively impact quality of life[2]. Analgesics, particularly non-steroidal anti-inflammatory drugs (NSAIDs), are frequently prescribed following dental extractions due to their analgesic and anti-inflammatory effects. However, selecting the most effective agent with the least adverse effects remains a key concern for clinicians[3].

Ibuprofen is a widely used NSAID that provides analgesic, antipyretic, and anti-inflammatory effects through the nonselective inhibition of cyclooxygenase (COX)-1 and COX-2 enzymes, thereby reducing prostaglandin synthesis[4]. It is considered a first-line agent for mild to moderate postoperative dental pain and is well-tolerated in most patients. However, nonselective NSAIDs, including ibuprofen, may pose gastrointestinal (GI) and renal side effects, especially in susceptible populations or when used at higher doses. These limitations have prompted the exploration of selective COX-2 inhibitors, such as celecoxib, which offer analgesia with a lower risk of GI complications[5].

Celecoxib, a selective COX-2 inhibitor, exerts its effects primarily at the site of inflammation, reducing pain and swelling while sparing COX-1–mediated gastric mucosal protection and platelet function[6]. Its pharmacological profile makes it an attractive alternative to traditional NSAIDs, particularly for patients at risk of GI adverse effects. Several studies have suggested that celecoxib provides comparable or superior analgesia to nonselective NSAIDs, with longer-lasting pain relief and reduced need for rescue medications in postoperative dental surgery[7,8].

Post-extraction pain is influenced by multiple factors, including surgical trauma, patient anxiety, and individual pain thresholds. Given the increasing emphasis on personalized medicine and enhanced recovery protocols, identifying an analgesic regimen that provides optimal pain control with minimal side effects is of clinical importance[7]. Comparative studies of NSAIDs can guide practitioners in selecting agents that maximize patient comfort while reducing the need for opioids, which carry higher risks of dependence and adverse events. Dental surgery thus provides a valuable model for evaluating analgesic efficacy in acute postoperative pain[9].

A study conducted by Bassyoniet al[10] has reported mean VAS score postoperatively at 24 hours 4.03 ± 2.53 with Celecoxib while 4.17 ± 2.28 with Ibuprofen and at 48 hours 2.23 ± 1.36 with Celecoxib while 3.37 ± 2.14 with Ibuprofen, hence showing Celecoxib to be more effective.

Different studies have been reported different results some studies have shown ibuprofen as more effective in pain relief while others have shown celecoxib as more effective in pain relief. Keeping these facts in our mind, we have planned to conduct this study in our local population of Karachi to ascertain which drug is more effective in our patients for post extraction pain relief. The results will help clinicians to offer more effective drug which will increase quality of life and productivity of our patients.

2. METHODOLOGY

The study was Quasi experimental design conducted in the

Department of Oral and Maxillofacial Surgery, Jinnah Postgraduate Medical Centre, over a period of six months (July 2024 to January 2025), following approval of the synopsis and ethical permission letter. A total of 78 patients, divided equally into two groups of 39 each, were included. The sample size was calculated using OpenEpi software, based on a mean VAS score of 2.23 ± 1.36[10] with celecoxib and 3.37 ± 2.14[10] with ibuprofen, with a power of 80% and a 95% confidence interval.

All eligible patients presenting to the outpatient department of Oral and Maxillofacial Surgery were screened through history and clinical examination. The study protocol, its purpose, potential risks, and benefits were explained, and written informed consent was obtained. A validated questionnaire was used to record demographic information, including age and gender.

Post-operative pain was measured using the Visual Analog Score (VAS), where a score of 0 indicated no pain and a score of 10 indicated severe pain. Pain was assessed at 24, 48, and 72 hours after the procedure. Smoking was defined as the consumption of more than 10 cigarettes per day for over 2 years. The hypothesis stated that Celecoxib was associated with a lower mean pain score in patients compared to Ibuprofen for post-extraction pain relief. Patients between 18 and 50 years of age of either gender undergoing tooth extraction were included if they were able to read and understand the questionnaires and provided informed consent. Psychiatric patients, those with a second dental trauma, pregnant women, and patients with known drug allergies, bleeding disorders, or ischemic heart disease were excluded.

Patients who met the inclusion criteria and underwent tooth extraction were randomly assigned to one of two groups using a draw method. Sealed envelopes marked with letters A and B were provided, with patients selecting envelope A assigned to receive 600 mg of ibuprofen orally, while those who selected envelope B were assigned to receive 200 mg of celecoxib. Both medications were administered immediately and four hours post-extraction. Pain was assessed using the Visual Analogue Scale (VAS) as per operational definitions. All extractions were performed under local anesthesia using lignocaine with adrenaline. Post-extraction antibiotic coverage with Augmentin 1 g orally per day was provided to all patients. All collected data were recorded in a structured proforma.

SPSS version 25 was used for data analysis of descriptive statistics in form of mean and standard deviation like age and VAS scores, while frequencies and percentages were calculated for categorical variables such as gender, residence and smoking status. An independent sample t-test was used to compare mean VAS scores between the two groups, and a p-value of ≤ 0.05 was considered statistically significant.

3. RESULTS

A total of 78 patients were included, with 39 in each group. The mean age was 34.9 ± 8.0 years, and there was a nearly equal gender distribution (52.6% male and 47.4% female). Most patients were from rural areas (59.0%), and 24.4% were smokers. At 24 hours postoperatively, the mean VAS score was significantly lower in the Celecoxib group (2.3 ± 1.1) compared to the Ibuprofen group (3.5 ± 1.4; $p = 0.002$). This trend persisted at 48 hours (1.8 ± 0.9 vs. 2.9 ± 1.3; $p = 0.001$) and 72 hours (1.2 ± 0.7 vs. 2.0 ± 1.0; $p = 0.004$). Celecoxib was consistently associated with better pain control compared to Ibuprofen.

Table-1: Demographic Characteristics of Patients (n = 78)

Variable	Group A (Celecoxib) n = 39	Group B (Ibuprofen) n = 39	Total (n = 78)	p-value
Age	34.6 ± 8.2	35.1 ± 7.9	34.9 ±	0.78

(years) (Mean ± SD)			8.0	
Gender				
Male, n (%)	20 (51.3%)	21 (53.8%)	41 (52.6%)	0.82
Female, n (%)	19 (48.7%)	18 (46.2%)	37 (47.4%)	
Residence				
Rural, n (%)	22 (56.4%)	24 (61.5%)	46 (59.0%)	0.65
Urban, n (%)	17 (43.6%)	15 (38.5%)	32 (41.0%)	
Smoking				
Yes, n (%)	10 (25.6%)	9 (23.1%)	19 (24.4%)	0.79
No, n (%)	29 (74.4%)	30 (76.9%)	59 (75.6%)	

Table-2: Comparison of Postoperative Pain (VAS Scores) Between Groups

Time Post-Extraction	Group A (Celecoxib) Mean ± SD	Group B (Ibuprofen) Mean ± SD	p-value
VAS at 24 hours	2.3 ± 1.1	3.5 ± 1.4	0.002
VAS at 48 hours	1.8 ± 0.9	2.9 ± 1.3	0.001
VAS at 72 hours	1.2 ± 0.7	2.0 ± 1.0	0.004

4. DISCUSSION

The challenge of achieving painless surgery remains, particularly in selecting appropriate analgesics. This study aimed to compare the effectiveness of tramadol and celecoxib in alleviating pain following third molar surgery, with the goal of identifying the more effective agent in this setting. Third molar extraction is a common dentoalveolar procedure in maxillofacial surgery, often associated with transient postoperative discomfort[10]. Both celecoxib and tramadol are widely used to manage postoperative pain, trismus, and swelling; however, this investigation specifically examined their roles in this surgical context[11].

In this randomized study of 78 patients (39 per group) celecoxib produced significantly lower mean VAS pain scores than ibuprofen at 24, 48 and 72 hours (24 h: 2.3 ± 1.1 vs. 3.5 ± 1.4; 48 h: 1.8 ± 0.9 vs. 2.9 ± 1.3; 72 h: 1.2 ± 0.7 vs. 2.0 ± 1.0). These findings are consistent with study conducted by Huang et al[12] and reported perioperative celecoxib has been shown to significantly reduce resting pain and opioid consumption at 48 and 72 hours after major orthopaedic procedures, supporting our observation of greater pain reduction at later time points (48–72 h). In 2009, Zamiri B et al[13] conducted a comparative study evaluating ibuprofen, tramadol, and celecoxib for pain control following third molar extraction.

In the study by Gulses et al[14] celecoxib provided significantly lower VAS scores than ibuprofen at 6, 12, and 24 hours following third-molar surgery. Similarly, Cheung et al[15] in a single-dose, double-blind trial, reported that although the onset of analgesia was comparable between celecoxib 400 mg and ibuprofen 400 mg, celecoxib resulted in greater pain relief at later time points and delayed the need for rescue medication.

More recently, Bassyoni et al[16] compared celecoxib 100 mg, diclofenac, and ibuprofen in patients undergoing surgical extraction of impacted third molars and found that both celecoxib and diclofenac provided significantly superior postoperative pain control compared to ibuprofen, particularly over the first 72 hours following surgery, reinforcing the role of selective COX-2 inhibitors like celecoxib as effective alternatives to traditional non-steroidal anti-inflammatory drugs (NSAIDs) in the management of postoperative dental pain.

This trial of 78 patients demonstrated that celecoxib provides superior postoperative analgesia to ibuprofen at 24, 48 and 72 hours after tooth extraction (24 h: 2.3 ± 1.1 vs. 3.5 ± 1.4; 48 h: 1.8 ± 0.9 vs. 2.9 ± 1.3; 72 h: 1.2 ± 0.7 vs. 2.0 ± 1.0; $p \leq 0.004$ for all). These findings add to a consistent body of evidence suggesting that COX-2 selective inhibition with celecoxib often achieves at least equal or superior analgesia compared

with nonselective NSAIDs such as ibuprofen after oral surgery and dental extractions[17].

In a study conducted by Akinbade et al[18] compared celecoxib, ibuprofen, and tramadol for postoperative pain control after impacted mandibular third-molar surgery and found that celecoxib achieved the lowest mean VAS scores at 4, 8, 24, and 48 hours (32.35 ± 23.96, 30.65 ± 20.75, 27.75 ± 20.42, and 20.40 ± 16.56) compared to ibuprofen (38.96 ± 22.30, 36.20 ± 21.53, 34.40 ± 21.18, and 28.45 ± 18.97) and tramadol (53.31 ± 23.30, 50.96 ± 22.11, 45.41 ± 21.85, and 36.90 ± 20.71), with statistically significant differences at all-time points ($p < 0.05$) .

Celecoxib's COX-2 selectivity reduces prostaglandin synthesis in inflamed tissues while sparing COX-1–mediated gastric and platelet protection, offering strong analgesia with fewer gastrointestinal effects than nonselective NSAIDs, though cardiovascular and renal risks remain concerns[19]. Jha et al[20] demonstrated that a higher dose of celecoxib (200 mg) provided significantly better control of postoperative pain and swelling following third molar surgery compared to diclofenac, highlighting celecoxib's enhanced efficacy as a selective COX-2 inhibitor in managing postoperative inflammatory symptoms.

5. CONCLUSION

Celecoxib provided significantly better pain relief than ibuprofen following tooth extraction, suggesting that selective COX-2 inhibition may offer an effective and well-tolerated alternative for postoperative analgesia in dental procedures.

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