SVOA Dentistry

e-ISSN 2753-9172

ScienceVolks Open Access

Research Article

The Evaluation of the Efficacy of Ketoprofen Analgesic Patches in Pain Control After Transalveolar Extraction of Impacted Third Molar

Md Shaklin Mustak Hussain[1*], Ajay Kumar Pillai[2], Priyanka Sharma[3], Shivangini Nayak[4], Anamika Juhi[5]

[1]Postgraduate Resident, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhopal, India.
[2]Professor, & Head, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhopal, India.
[3]Reader, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhopal, India.
[4]Senior Lecturer, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhopal, India.
[5]Postgraduate Resident, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhopal, India.

***Corresponding Author:** Dr. Md Shaklin Mustak Hussain, Postgraduate Resident, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhopal, India.

https://doi.org/10.58624/SVOADE.2026.07.008

Received: February 05, 2026

Published: February 24, 2026

Citation: Hussain MSM, Pillai AK, Sharma P, Nayak S, Juhi A. The Evaluation of the Efficacy of Ketoprofen Analgesic Patches in Pain Control After Transalveolar Extraction of Impacted Third Molar. *SVOA Dentistry* 2026, 7:1, 57-62. doi: 10.58624/SVOADE.2026.07.008

Abstract

Background: Postoperative pain following transalveolar extraction of impacted third molar remains a significant concern for both clinicians and patients. Non-steroidal anti-inflammatory drugs (NSAIDs) are routinely prescribed; however, their oral administration is associated with gastrointestinal irritation, frequent dosing, and reduced patient compliance. Transdermal drug delivery systems provide sustained analgesia with reduced systemic exposure. Ketoprofen, a propionic acid derivative NSAID, demonstrates favorable pharmacokinetic properties for transdermal administration.

Aim: To evaluate the efficacy and safety of ketoprofen transdermal analgesic patches in controlling postoperative pain following transalveolar extraction of impacted third molar.

Materials and Methods: A clinical study was conducted on 30 ASA I patients requiring transalveolar extraction of impacted third molar. Each patient received a ketoprofen transdermal patch on the ipsilateral deltoid region after extractions. Postoperative pain was assessed using the Visual Analogue Scale (VAS) at 2, 6, 12, and 24 hours. The requirement for rescue analgesics and the occurrence of adverse effects were recorded. Statistical analysis was performed using an ANOVA test with significance set at $p < 0.05$.

Results: Ketoprofen transdermal patches demonstrated significantly lower mean VAS scores at 2, 6, 12, and 24 hours ($p < 0.05$). The need for rescue analgesics within the first 24 hours was less. No serious local or systemic adverse effects were reported.

Conclusion: Ketoprofen transdermal patches provide effective and safe postoperative analgesia following minor oral surgical procedures and may serve as a reliable alternative to conventional oral NSAIDs.

Keywords: *Ketoprofen Patch, Transdermal Drug Delivery, Postoperative Pain, Minor Oral Surgery, NSAIDs*

Introduction

Pain is defined as an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage'.[1] In Oral and Maxillofacial Surgery, postoperative pain is one of the most common causes of patient discomfort and dissatisfaction because surgical trauma inevitably leads to tissue injury, inflammation, and activation of nociceptive pathways. Procedures such as third molar surgery, transalveolar extractions, implant placement, and cyst enucleation involve bone removal and soft tissue manipulation, which result in the release of inflammatory mediators including prostaglandins, bradykinin, substance P, and cytokines. These mediators sensitize peripheral nociceptors, thereby intensifying pain perception in the postoperative period.[2]

Inadequate pain control can negatively impact patient behavior and compliance. Patients experiencing significant pain may avoid mastication, oral hygiene practices, and postoperative instructions, further contributing to delayed healing and increased risk of complications such as alveolar osteitis or surgical site infection.[3] Therefore, effective postoperative pain management is essential not only for patient comfort but also for modulating the neuroendocrine stress response, promoting optimal wound healing, reducing postoperative morbidity, and improving overall patient satisfaction in Oral and Maxillofacial Surgery.

Non-steroidal anti-inflammatory drugs (NSAIDs) remain the cornerstone of postoperative pain management in Oral and Maxillofacial Surgery because of their ability to inhibit cyclooxygenase (COX) enzymes and reduce prostaglandin synthesis, thereby providing effective analgesic and anti-inflammatory effects.[4] They are routinely prescribed following procedures such as transalveolar extraction of impacted third molars, where tissue trauma and bone removal provoke significant postoperative inflammation and pain. However, the oral administration of NSAIDs is frequently associated with adverse effects, including gastrointestinal irritation, peptic ulceration, renal impairment, and increased cardiovascular risk, particularly with repeated dosing.[5] Additionally; the need for multiple daily doses may reduce patient compliance, especially in the immediate postoperative period when nausea, dysphagia, or limited mouth opening may be present.[6]

Transdermal drug delivery systems have therefore emerged as an effective alternative route for postoperative analgesic administration. These systems allow drugs to be delivered through the skin directly into the systemic circulation, thereby avoiding first-pass hepatic metabolism and reducing gastrointestinal exposure.[7] Transdermal patches provide controlled and sustained drug release, resulting in more stable plasma drug concentrations and prolonged analgesic effects, which can improve patient comfort and compliance.[8]

Ketoprofen, a propionic acid derivative NSAID, possesses physicochemical properties that make it particularly suitable for transdermal delivery. Its relatively low molecular weight and high lipophilicity facilitate effective penetration across the stratum corneum.[9] Ketoprofen exhibits potent inhibition of both COX-1 and COX-2 enzymes, leading to significant suppression of prostaglandin-mediated pain and inflammation. Clinical studies have demonstrated that transdermal ketoprofen provides effective postoperative analgesia with a lower incidence of systemic adverse effects compared to oral formulations.[10]

In view of these advantages, the present study was designed to evaluate the efficacy of ketoprofen transdermal patches in controlling postoperative pain following transalveolar extraction of impacted third molars, a procedure commonly associated with moderate to severe postoperative pain and inflammation.

Materials and Methods

Study Design

The present study was designed as a prospective clinical trial to evaluate the efficacy of ketoprofen transdermal patches 30mg (KetoPLAST+, Zuventus) in the management of postoperative pain following transalveolar extraction of impacted third molars. The study was conducted after obtaining approval from the institutional ethical committee, and all procedures were performed in accordance with the ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment.

Each participant underwent transalveolar extraction of the impacted third molar. At the surgical visit, a ketoprofen transdermal patch was applied postoperatively on the ipsilateral deltoid region. Postoperative pain assessment and data collection were carried out by an independent investigator.

Study Population

The study population comprised 30 healthy patients classified as American Society of Anesthesiologists (ASA) Physical Status I, aged between 18 and 30 years, who required transalveolar extraction of impacted third molars. Patients were included if they required transalveolar extraction of impacted third molars, were systemically healthy (ASA Class I), and were willing to participate in the study with compliance to the prescribed follow-up protocol. Patients with a history of allergy to non-steroidal anti-inflammatory drugs, those with any systemic illness, and pregnant or lactating women were excluded from the study.

Surgical Procedure

All procedures were performed by a single oral and maxillofacial surgeon under local anesthesia using 2% lignocaine with 1:200,000 adrenaline (Neon). Following all aseptic protocols, transalveolar extraction was performed in a standard manner.

Intervention

Ketoprofen transdermal patch 30mg (KetoPLAST+, Zuventus) was applied over the deltoid region on the same side immediately after surgery. A rescue analgesic (ketorolac 10 mg) was prescribed, and patients were instructed to take it if required.

Outcome Measures

- Postoperative pain was assessed using a 10-point VAS at 2, 6, 12, and 24 hours.
- Rescue analgesic consumption (ketorolac 10 mg).
- Occurrence of adverse reactions.

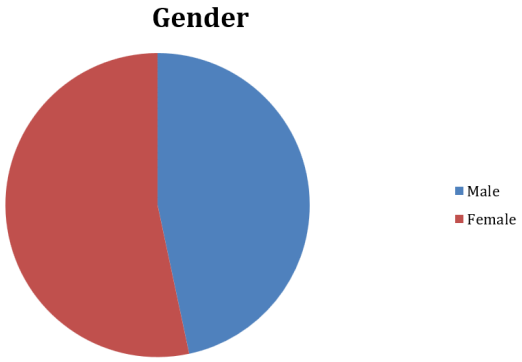
Statistical Analysis

Data was analyzed using IBM SPSS version 25. A p-value < 0.05 was considered statistically significant.

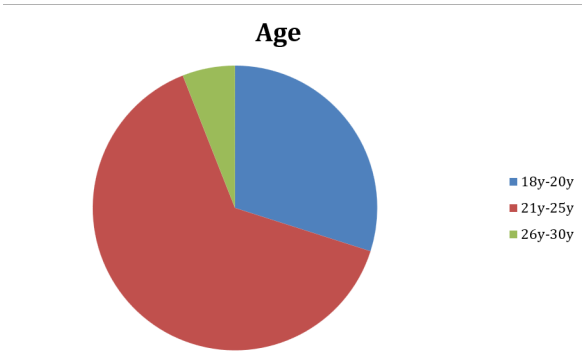
Results

All 30 patients completed the study. All 30 patients (100%) were evaluated through a follow-up phase. Out of 30 patients, 16(53.33%) were female and 14(46.66%) were male (Graph 1). Among the study group 7(23.33%) were aged 18 to 20 years, 15(50%) were 21 to 25 years, and 8(26.66%) were 26 to 30 years (Graph 2). The outcome variables were recorded in terms of pain intensity at 2 hours, 6 hours, 12 hours, and 24 hours postoperatively. The pain intensity was measured using the Visual Analog Scale (VAS) at four intervals: 2, 6, 12, and 24 hours post-operatively.

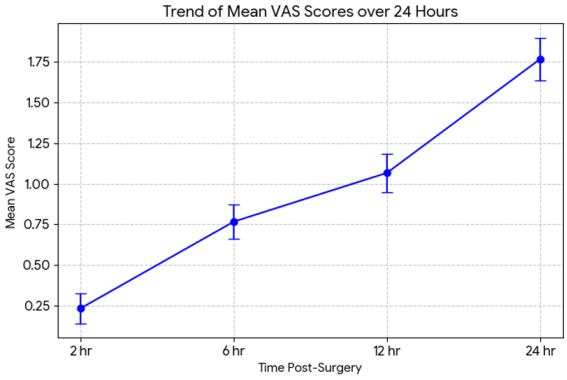
The mean VAS scores showed a progressive increase over the 24-hours period, starting from a baseline mean of 0.23 ± 0.50 at 2 hours and reaching 1.77 ± 0.73 at 24 hour (Graph 3). A Repeated Measures ANOVA was performed to evaluate the change in pain intensity over time. The significant effect of time on VAS scores ($F(3,87) = 36.29$, $p < 0.001$) confirms that postoperative pain followed a predictable temporal pattern, with variations in intensity across the early and late postoperative periods. Post-hoc Bonferroni analysis demonstrated significant increases in pain scores across time intervals, except between 6 and 12 hours, indicating a plateau in analgesic effect. The requirement for rescue analgesia was minimal, with only one participant requiring additional analgesic medication at 12 hours and eight participants at 24 hours postoperatively (Graph 4). No local or systemic adverse effects were reported in any patient receiving the ketoprofen transdermal patch.



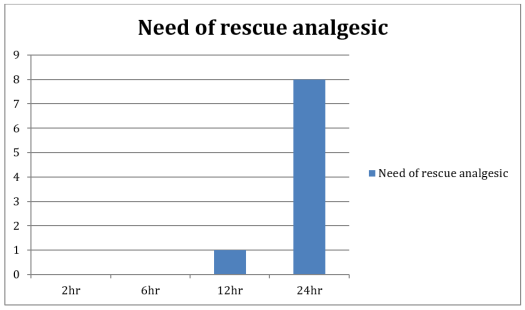
Graph 1. Gender, male 14 and female 16.



Graph 2. Age distribution, 18-20y, 21-25y and 26y-30y



Graph 3. Mean VAS score and standard deviation.



Graph 4. Need for rescue analgesic.

Discussion

Effective postoperative pain control is a key determinant of patient comfort and functional recovery following transalveolar extraction of impacted third molars. In the present study, Ketoprofen transdermal patches demonstrated effective postoperative analgesia, as evidenced by consistently low VAS scores across all assessed time intervals and a minimal requirement for rescue analgesics.

In the present study, VAS scores at 2 and 6 hours postoperatively were low, indicating effective control of immediate postoperative pain. This finding is in agreement with the observations of **Kumar et al.**, who reported significantly lower early postoperative pain scores in patients receiving transdermal ketoprofen following minor oral surgical procedures when compared with baseline pain levels[11]. Similarly, **Singla et al.** noted that transdermal NSAID patches provided adequate analgesia during the early inflammatory phase, attributed to continuous systemic absorption of the drug soon after patch application[12].

In contrast, studies evaluating oral NSAIDs following third molar surgery have reported higher pain scores during the early postoperative period due to delayed absorption and fluctuating plasma drug levels[13]. The superior early pain control observed in the present study may therefore be attributed to the avoidance of gastrointestinal absorption variability associated with oral analgesics.

Postoperative pain after third molar surgery typically peaks between 12 and 24 hours due to progressive inflammatory mediator release[14]. Despite this, the present study demonstrated only a modest increase in VAS scores at 12 and 24 hours, with pain levels remaining within the mild range. This sustained analgesic effect is consistent with the findings of Barden et al., who emphasized that analgesic regimens providing stable plasma concentrations are more effective in controlling late postoperative pain following third molar extraction[15].

The absence of a statistically significant difference between VAS scores at 6 and 12 hours in the present study suggests a plateau phase of analgesic efficacy. A similar plateau effect was reported by Prausnitz and Langer, who described sustained drug release as a key pharmacokinetic advantage of transdermal delivery systems[16]. In contrast, oral NSAID regimens often require repeated dosing to maintain analgesic efficacy during this period, increasing the risk of adverse effects and non-compliance[17].

The requirement for rescue analgesics in the present study was minimal, with only one patient requiring additional medication within the first 12 hours and eight patients by 24 hours. This finding corroborates the results of Singla et al., who observed a significantly reduced need for supplementary analgesics in patients managed with transdermal NSAIDs compared to conventional oral analgesic protocols[12].

Conversely, Moore and Hersh reported higher rescue analgesic consumption in patients receiving oral NSAIDs following dentoalveolar surgery, particularly during the late postoperative phase[18]. The reduced need for rescue medication in the present study further supports the prolonged and consistent analgesic action of ketoprofen delivered via the transdermal route.

An important observation in the present study was the absence of significant local or systemic adverse effects, particularly gastrointestinal complications. This finding is in agreement with Laine, who highlighted that gastrointestinal irritation remains a major limitation of oral NSAID therapy[19]. The lack of gastric adverse effects in the present study supports the advantage of transdermal administration, which bypasses the gastrointestinal tract and first-pass hepatic metabolism.

Similar safety profiles have been reported by Hadgraft, who demonstrated improved tolerability and patient compliance with transdermal NSAID systems. Compared to intramuscular or intravenous NSAID administration, the transdermal route also eliminates injection-related pain and complications, as previously emphasized by Moore and Hersh[18].

Taken together, the findings of the present study are largely consistent with previous literature supporting the efficacy and safety of transdermal NSAIDs. However, unlike many earlier studies that evaluated transdermal analgesics in general surgical or orthopedic settings, the present study specifically demonstrates their clinical usefulness in third molar surgery, a procedure characterized by predictable postoperative pain escalation. This adds procedure-specific evidence supporting the use of ketoprofen transdermal patches in outpatient oral and maxillofacial surgery.

Conclusion

Ketoprofen transdermal patches offer effective, safe, and convenient postoperative pain control following transalveolar extraction of third molar. They may be recommended as an alternative to oral and IV/IM NSAIDs.

Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. *Pain*. 2020;161(9):1976–1982.

2. Marucha PT, Kiecolt-Glaser JK, Favagehi M. Mucosal wound healing is impaired by examination stress. *Psychosom Med*. 1998;60(3):362–365.

3. Glaser R, Kiecolt-Glaser JK. Stress-induced immune dysfunction: implications for health. *Nat Rev Immunol*. 2005;5(3):243–251.

4. Vane JR, Botting RM.Mechanism of action of nonsteroidal anti-inflammatory drugs. *Am J Med*. 1998;104(3A):2S–8S.

5. Bjarnason I, Scarpignato C, Holmgren E, Olszewski M, Rainsford KD, Lanas A. Mechanisms of damage to the gastrointestinal tract from nonsteroidal anti-inflammatory drugs. *Gastroenterology*. 2018;154(3):500–514.

6. Hersh EV, Moore PA, Ross GL.Over-the-counter analgesics and antipyretics: a critical assessment. *Clin Ther*. 2000;22(5):500–548.

7. Paudel KS, Milewski M, Swadley CL, Brogden NK, Ghosh P, Stinchcomb AL. Challenges and opportunities in dermal/transdermal delivery. *Ther Deliv*. 2010;1(1):109–131.

8. Prausnitz MR, Langer R. Transdermal drug delivery. *Nat Biotechnol*. 2008;26(11):1261–1268.

9. Rainsford KD. Anti-inflammatory and analgesic properties of ketoprofen. *Drugs*. 1985;30(Suppl 4):1–10.

10. Derry S, Moore RA. Topical NSAIDs for acute musculoskeletal pain in adults. *Cochrane Database Syst Rev*. 2015;(6):CD007402.

11. Kumar S, et al. Efficacy of transdermal ketoprofen patch in postoperative dental pain. *J Clin Diagn Res.* 2016;10(9):ZC08–ZC11.

12. Singla NK, et al. Transdermal NSAIDs in postoperative pain management. *J Pain Res.* 2015;8:87–94.

13. Seymour RA, Meechan JG, Blair GS. Postoperative pain after third molar surgery. *Br J Oral Maxillofac Surg.* 1985;23:410–418.

14. Bailey BM, Zaki GA. Postoperative pain following third molar surgery. *Br J Oral Maxillofac Surg.* 1988;26:333–339.

15. Barden J, et al. Analgesic response after third molar extraction. *Pain.* 2004;107:86–95.

16. Rainsford KD. NSAID pharmacokinetics and adverse effects. *Am J Med.* 1999;107:27S–35S.

17. Moore PA, Hersh EV. Pharmacologic management of dental pain. *Dent Clin North Am.* 2010;54:785–802.

18. Laine L. NSAID-related gastrointestinal toxicity. *Gastroenterology.* 2001;120:594–606.

19. Hadgraft J. Transdermal drug delivery systems. *Int J Pharm.* 2001;224:1–18.