ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 09 | September - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EFFICACY AND SAFETY OF TRANSDERMAL DICLOFENAC PATCH FOR POST-EXTRACTION PAIN CONTROL.

Dental Science

Dr. Shelly Sharma* Assistant professor in Oral and Maxillofacial Surgery, Subharti Dental College. Swami Vivekanand Subharti University, Meerut.*Corresponding Author

Dr.Nitish Chandra Gupta Assistant professor in Oral and Maxillofacial Surgery, Subharti Dental College. Swami Vivekanand Subharti University, Meerut.

ABSTRACT

Purpose - To analyze the degree of post-operative analgesia, patient compliance, and frequency of adverse effects with the use of Transdermal Diclofenac Patch (100 mg) following extractions.

Materials and Methods: Thirty patient's undergoing maxillary or mandibular premolar extractions were selected for the study. The premolars were extracted under Local Anesthesia with 1: 200000 Adrenaline. For post extraction pain control, 100mg Transdermal Diclofenac Patch of 50 square cm was applied once a day for three days. Pain relief and pain intensity was recorded for three postoperative days using Numeric Pain Rating Scale and Pain Relief Scales that were on the proforma that were handed to the patients. At the end of three days Global Pain assessment was evaluated. None of the patients were given any prophylactic medications. Side effects and rescue medications taken were recorded.

Results : Results revealed that there was gradual decrease in Subjective pain as shown in Numeric Pain Assessment Scale, increase in pain relief scores with the Transdermal patch. Four patients had to take rescue medication for post extraction pain control.

Conclusion- Results of this study indicate that the Transdermal Diclofenac Patch provides satisfactory analgesia for routine post extraction pain. Patient compliance was excellent and none of the patients had allergic side effects from application of patch.

KEYWORDS

Diclofenac sodium, post extraction analgesia, transdermal patch, Numeric Pain rating Scale, Pain Relief Scale, Global Pain Assessment.

INTRODUCTION

Pain has closely been linked to dentistry and has been a major concern to the surgeon[1]. Post extraction pain has been a nemesis for dental surgeon and studies are going on to find an analgesic modality that would provide profound analgesia and is best tolerated by patient[2].

Diclofenac Sodium is most commonly prescribed NSAID that has anti-inflammatory, analgesic and anti-pyretic properties[3,4]. There have been many forms of delivering the same drug through different routes in the body. Diclofenac Transdermal Patch in recent times has been used in oral and maxillofacial region following dental extractions and in the management of Myofascial Pain Dysfunction Syndrome of the upper trapezius[5] where it proves to be a potent analgesic.

The present study is carried out to evaluate the post-operative analgesia, patient tolerability, compliance and adverse effects with the use of Transdermal Diclofenac Patch (100 mg) following extractions in North Indian patients.

METHODOLOGY

A prospective study was done on thirty patients. Patients requiring maxillary and/ or mandibular teeth extractions for orthodontic purpose that could be carried out in outpatient setting were included in the study. Detailed case history was taken and patients with known allergy with NSAIDs or any form of skin allergy were excluded from the study. Radiographically, teeth to be extracted were examined using standard intraoral periapical radiograph and/or Orthopantomogram. An informed consent was obtained from all the patients.

Maxillary and/ or mandibular teeth were extracted and Transdermal Diclofenac Patch (Nu-patch, 100mg) was placed within 30 minutes after extraction. Patients were given instructions to change the patch after every 24 hours for 3 days.

After the extractions, patients were given printed hand-outs on which they assigned pain scores using:

1. Numeric Pain Rating Scale
2. Pain Relief Scale at interval of 2 hrs, 4 hrs, 8 hrs, 12 hrs and 24 hrs and a total of 72 hrs post-operatively
3. At the end of 72 hrs Global Pain Assessment Scale of the overall experience of the patient.

There was no intra-operative complication like root fracture in any patient and post-operative healing was satisfactory. All the extractions were done by single operator. All the patients in included study received prescription for Rescue Medication consisting of Ibuprofen 400mg and Paracetamol 500mg (IBUPARA), which the patients were advised to take if he/she experiences pain beyond tolerable limits during the three day period of drug administration.

The recordings of Rescue Medication utilization were recorded under the following categories:

1) Total no. of tablets taken
2) Time at which Rescue Medications were taken
3) Relief of pain after rescue medication

PARAMETERS NOTED:

a) Pain intensity assessment using NUMERIC PAIN RATING SCALE (NRS). Patients were asked to record on 100 mm straight line over a period of 2 hrs, 4 hrs, 8 hrs, 12 hrs, 24 hrs and 72 hrs after extraction.

Anchor points being: 0: No pain and 10: Worst possible pain

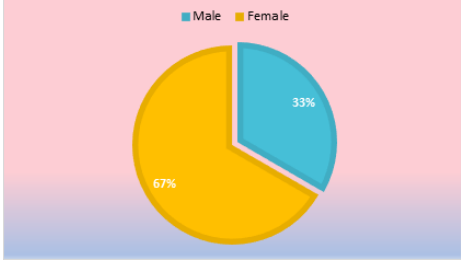
Figure 1- Numeric Pain Rating Scale

b) PAIN RELIEF SCALE was recorded on a scale of 0 to 3 Anchor Points being-- 0 = No relief, 1 = Some relief, 2 = Lot of relief and 3 = Complete relief of pain

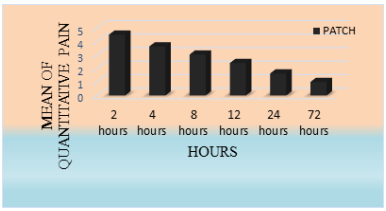
Pain relief scale	2 hrs	4 hrs	8 hrs	12 hrs	24 hrs	72 hrs
Value						

c) GLOBAL ASSESSMENT of patients inference about analgesic efficacy of the modality at 72 hrs following extraction were assessed on a scale of 0 to 3.

RESULTS 3

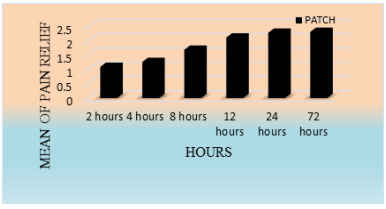


Pie chart- Out of 30 subjects, 67% were females and 33% were males.

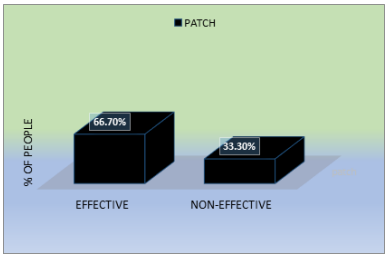


Graph 1- Results for Numeric Pain Rating Scale

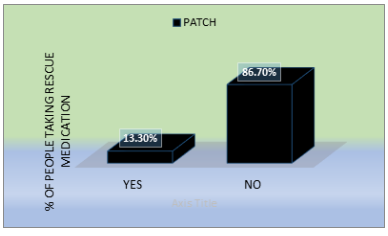
On Quantitative pain assessment, patients stated that there was significant difference in pain reduction from first post-operative day to third post-operative day



Graph 2- On evaluating the variation of pain relief, all the patients reported almost complete relief by the third post-operative day of therapy by transdermal route.



Graph 3- Results for Global pain assessment. 66.7% patients found Transdermal Diclofenac Patch to be effective modality of pain control.



Graph- 4 Rescue medication for post extraction pain control was required by 13.3% of patients.

4 out of 30 patients required rescue medications, only one tablet after 2 hrs of extraction but the results were statistically insignificant.

DISCUSSION

There are many ways to deliver NSAIDs like oral, parentral and inhalational. In oral route, first pass metabolism occurs, while parentral drug delivery system is painful. There are constant studies going on to find an analgesic modality that has as good effect as traditional routes and can be tolerated by the patients. Transdermal route of drug delivery allows the active ingredients of drug to be delivered through skin into capillaries for systemic delivery of drug[6], therefore skipping, and the adverse effects of oral route. Diclofenac is one of the few drugs that can be administered through transdermal route as well. Transdermal patch of Diclofenac relieves mild-moderate pain and the steady permeation of drug across the skin allows more consistent serum levels, often the goal of therapy[7].

In the present study we have used Transdermal Diclofenac Patch in form of Nu-patch by Zydus Cadila containing 100mg of Diclofenac Diethyl amine in patients requiring extractions for orthodontic purposes. The transdermal Diclofenac patch is a flat, transparent device and is packaged in hermetically sealed, foil lined packets and is applied to any area that is devoid of hair[8,10]. The patch achieves plasma levels ranging between 0.7-6 ng/ml[9] which is lesser when compared to oral route, but levels are sustained for longer time.

The analgesic efficacy, pain relief, pain intensity and tolerability of Diclofenac were evaluated on subjective scales- Numeric Pain Rating Scale (NPRS) and Pain Relief Scale (PRS). The extractions were done followed by application of Transdermal Diclofenac patch and a proforma of subjective scales. In the current study it was found that patients experienced significant pain relief at the time interval of 8- 12 hrs as measured on Numeric Pain Rating Scale.

H Bhaskar[4] in his study used two subjective scales verbal pain intensity scale and pain relief score. There was a gradual decrease in pain intensity scores in both the groups and on evaluating with Man Whitney test, p value was not significant. Also in pain relief score from day 1 to day 2, 50 % of patients noted significant pain relief in oral Diclofenac Sodium. On other hand, 65 % of patients in Transdermal Diclofenac patch had pain relief from day 1 to day 2. One patient on Transdermal Diclofenac required rescue medication and none on oral Diclofenac group.

P S Bachalli[5] in his study evaluated pain on 4 subjective scales- Visual analogue scale (VAS), Verbal Rating Scale (VRS), Pain Intensity Scale (PIS), Pain Relief Scale (PRS). Based on statistical data in VAS there was no statistical difference in either route of drug delivery, in VRS, p value suggests significantly better pain relief on oral administration as compared to transdermal patch at 2 hrs, and 12 hrs but no difference in subsequent intervals. In PRS, there was significantly better pain relief on oral administration compared to transdermal route at 2 hr interval. No statistical difference was found in either route in subsequent hrs. In PIS, P value indicates moderately significant pain relief in oral route as compared to Transdermal route at 2 hrs, 4 hrs, 8 hrs and 24 hrs intervals.

In present study, NPRS states that, there is constant decrease in pain till 3rd post-operative day similarly in PRS, there is gradual increase in pain relief in both the groups over a period of 72 hrs. 4 out of 30 patients on transdermal patch required rescue medication.

Local cutaneous adverse effects (pruritus and rash) with use of patch were reported by **H G Predel et al**[6]. Another study that was conducted by **Lee J** and **Burke DT** [7] reported lower gastro-intestinal bleed in a patient using transdermal patch who was previously on anti-platelet therapy. The adverse effects by Transdermal patch can be avoided by taking thorough history of any allergy or previous medication and by changing the position of patch on daily basis.

As a whole in our study, Transdermal Diclofenac Patch (100 mg) proved effective in controlling post extraction pain. It can be successfully used in patients who are non-compliant to traditional methods of drug delivery. However, further studies are required to validate this result.

REFERENCES

1. Bhaskar H, Kapoor P and Ragini. Comparision of transdermal diclofenac patch with oral diclofenac as analgesic modality following multiple premolar extractions in orthodontic patients: A crossover efficacy trial. Contemp Clic Dent. 2010 Jul-Sep;1: 158-163.
2. Bachalli PS, Nandkumar H, Srinath N. A comparative study of diclofenac transdermal patch against oral diclofenac for pain control following removal of mandibular impacted third molar. J Maxillofac Oral Surg. 8;167-172.
3. H G Predel, R Koll, H Pabst, R Dieter, G Gallacchi, B Giannetti, M Bulitta, J L Heidecker, E A Mueller. Diclofenac patch for topical treatment of acute impact injuries: a randomised, double blind, placebo controlled, multicentre study.Br J Sports Med. 2004;38:318–323.
4. Karabayirli S, Demircioglu RI, Muslu B, Usta B, Sert H, Gozdemir M. The comparative effects of Transdermal and intramuscular diclofenac on postlaproscopic surgery pain. Surg Laprarosc Endosc Percutan Tech. 2012 Aug;22:374-378.
5. Simon LS, Grierson LM, Naseer Z, Bookman AAM, Shainhouse JZ. Efficacy and safety of topical diclofenac containing dimethyl sulfoxide (DMSO) compared with those of topical placebo, DMSO vehicle and oral diclofenac for knee osteoarthritis. PAIN.2009;143:238–245.
6. Hsieh LF, Hong CZ, Chern SH, and Chen CC. Efficacy and Side Effects of Diclofenac Patch in Treatment of Patients with Myofascial Pain Syndrome of the Upper Trapezius.Journal of Pain and Symptom Management. 2010 Jan;39.
7. Mayer M, Weiss P. Antiphlogistic and analgesic effect of diclofenac sodium after maxillofacial interventions in a double-blind trial. Dtsch Zahnarztl Z. 1980;35:559-63.
8. Brogden RN, Heel RC, Pakes GE, Speight TM and Avery GS. Diclofenac Sodium: a review of its pharmacological properties and therapeutic use in rheumatic diseases and pain of varying origin. Drugs. 1980July;20(1):24-48.
9. Small RE. Diclofenac Sodium. Clinics of Pharm.1989Aug;8:545-58.
10. Radermacher J, Jentsch D, Scholl M A, Lustinetz T, Frolich J C. Diclofenac concentrations in synovial fluid and plasma after cutaneous application in inflammatory and degenerative joint disease. Br. J. Clin Pharmac. 1991;31:537-541.
11. Hyrkäs T, Ylipaavalniemi P, Oikarinen VJ, Hampf G. Postoperative pain prevention by a single-dose formulation of diclofenac producing a steady plasma concentration. J Oral Maxillofac Surg. 1992 Feb;50:124-7.
12. Johnson AG, Seideman P, Day RO. Adverse drug interactions with nonsteroidal anti-inflammatory drugs (NSAIDs). Recognition, management and avoidance. Drug Saf. 1993 Feb;8:99-127.
13. Bailey BM, Zaki G, Rotman H, Woodwards RT. A double-blind comparative study of soluble aspirin and diclofenac dispersible in the control of postextraction pain after

removal of impacted third molars. Int J Oral Maxillofac Surg. 1993 Aug;22:238-41.
14. Borenstein MR, Xue Y, Cooper S, Tzeng TB.Sensitive capillary gas chromatographic-mass spectrometric-selected-ion monitoring method for the determination of diclofenac concentrations in human plasma. J Chromatogr B Biomed Appl. 1996 Oct 11;685:59-66.
15. Zmeili S, Hasan M, Najib N, Sallam E, Deleq S, Shubair M. Bioavailability and pharmacokinetic properties of 2 sustained-release formulations of diclofenac sodium, Voltaren vs inflaban: effect of food on inflaban bioavailability. Int J Clin Pharmacol Ther. 1996 Dec;34:564-70.
16. Poli A, Moreno RA, Ribeiro W, Dias HB, Moreno H Jr, Muscara MN, De Nucci G. Influence of gastric acid secretion blockade and food intake on the bioavailability of a potassium diclofenac suspension in healthy male volunteers. Int J Clin Pharmacol Ther. 1996; 34:76-79.
17. Davies NM, Anderson KE. Clinical pharmacokinetics of diclofenac. Therapeutic insights and pitfalls. Clin Pharmacokinet. 1997 Sep;33:184-213.
18. Klimes J, Sochor J, Dolezal P, Körner J. HPLC evaluation of diclofenac in transdermal therapeutic preparations. Int J Pharm. 2001 Apr 17;217:153-60.
19. Su SF, Chou CH, Kung CF and Huang JD. In vitro and in vivo comparison of two diclofenac sodium sustained release oral formulations. Int J Pharm. 2003 Jul 9;260:39-46.
20. Zuniga JR, Phillips CL, Shugars D, Lyon JA, Peroutka SJ, Swarbrick J, Bon C Analgesic safety and efficacy of diclofenac sodium softgels on postoperative third molar extraction pain. J Oral Maxillofac Surg. 2004 Jul;62:806-15.
21. Lorna Mason, R Andrew Moore, Jayne E Edwards, Sheena Derry and Henry J McQuay. Topical NSAIDs for acute pain: a meta-analysis. BMC Family Practice. 2004,5:10.
22. Joshi A, Parara E, Macfarlane TV. A double-blind randomised controlled clinical trial of the effect of preoperative ibuprofen, diclofenac, paracetamol with codeine and placebo tablets for relief of postoperative pain after removal of impacted third molars. Br J Oral Maxillofac Surg. 2004 Aug;42:299-306.
23. Naesdal J, Brown K. NSAID-associated adverse effects and acid control aids to prevent them: a review of current treatment options. Drug Safety 2006 Feb;29:119-132.
24. Agarwal A, Gautam S, Gupta D, Singh U. Transdermal diclofenac patch vs eutectic mixture of local anesthetics for venous cannulation pain. Can J Anaesth. 2007 Mar;54:196-200.
25. Leeson RM, Harrison S, Ernst CC, Hamilton DA, Mermelstein FH, Gawarecki DG, Moshman M, Carr DB. Dyloject, a novel injectable diclofenac formulation, offers greater safety and efficacy than voltarol for postoperative dental pain. Reg Anesth Pain Med. 2007 Jul-Aug;32:303-10.
26. Ritesh Kumar and Anil Philip. Modified Transdermal Technologies: Breaking the Barriers of Drug Permeation via the Skin. Tropical Journal of Pharmaceutical Research. 2007 March; 6:633-644.
27. Beaulieu AD, Peloso PM, Haraoui B, Bensen W, Thomson G, Wade J, Quigley P, Eisenhoffer J, Harsanyi Z, Darke AC. Once-daily, controlled-release tramadol and sustained-release diclofenac relieve chronic pain due to osteoarthritis: a randomized controlled trial. Pain Res Manag. 2008 Mar-Apr;13:103-10.
28. Simon S. L, Grierson M.L, Naseer Z, Bookman A.A.M, Shainhouse J. Z. Efficacy and safety of topical Diclofenac containing dimethyl sulfoxide (DMSO) compared with those of topical placebo, DMSO vehicle and oral diclofenac for kee osteoarthritis. Pain. 2009; 143:238-245.