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Original Research

Effect of preoperative medications on the efficacy of inferior alveolar nerve block in patients with irreversible pulpitis: A placebo-controlled clinical study

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***ABSTRACT*:**

Aim: The aim of this prospective, randomized, double-blind, placebo-controlled study was to equate the effect of the administration of preoperative 7.5mg meloxicam, ketorolac 10 mg versus placebo for the potential increased effectiveness of the inferior alveolar nerve block [IANB] anesthesia. **Material & Methods:** Total of 150 endodontic emergency patients in moderate to severe pain diagnosed with irreversible pulpitis of a mandibular posterior tooth randomly received, in a double-blind manner. They were given either placebo, 10 mg ketorol, or 7.5mg meloxicam an hour before local anaesthesia. Each participant recorded their pain score on a 10 centimetre visual analogue scale four times during the procedure. Pain was recorded: 1) before taking the analgesic, 2) 15 minutes after anaesthesia in response to an electric pulp test 3) during access cavity preparation and 4) during biomechanical preparation. No or mild pain at any stage was reported as success. **Results:** Data were analysed by the Kruskal-Wallis and one-way analysis of variance tests. Ketorol and meloxicam showed significantly better results than placebo ($p<0.05$). The success rates were 92%, 88% and 60% for ketorol, meloxicam and placebo, respectively. **Conclusion:** There was no significant difference between ketorol and meloxicam ($p>0.05$). The study concludes premedication with ibuprofen and meloxicam significantly enhances the effectiveness of local anaesthesia in patients with irreversible pulpitis.

Key Words: Preoperative medication, IANB, Irreversible Pulpitis.

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INTRODUCTION:

Inferior alveolar nerve block (IANB) has been regarded as one of the most technically difficult local anesthesia injections and is clinically adequate in 85-90% of the time in restorative dentistry but its efficacy is reduced to 20% in irreversible pulpitis. An effective local anesthesia is a prerequisite for pain control in endodontics. The IANB is most frequently used mandibular injection technique for achieving local anesthesia for endodontic treatment. Anesthetic failures after IANB have been reported to be between 44% and 81%. [1] The lack of profound anesthesia in teeth with inflamed pulp (irreversible pulpitis) is a well-known clinical symptom. It has been suggested that inflammation and infection lower tissue pH altering the ability of local anesthetic to provide clinically adequate pain control. Many theories have been proposed as the causative factors for the lack of achievement of successful anesthesia in mandibular teeth with irreversible pulpitis. The hyperalgesia

triggered by the inflammatory process leading to alteration of neural response [4], raised levels of prostaglandins and activation of nociceptors [1], lowered pH which hampers the ability of the anesthetic to penetrate the membrane [1, 5], tetrodotoxin resistant sodium channels shown in human symptomatic dental pulp and trigeminal ganglion [6], the sprouting of the nerve fibers [7], and increase in neuropeptides such as Substance P and calcitonin gene-related peptide (CGRP) resulting in the expression of inflammatory mediators [8] are some suggestions made to explain the reason of anesthetic failure associated with acute symptomatic teeth. Nonmyelinated C-fibers which pose difficulty in terms of provision of anesthesia have also been proposed as a contributing factor [9]. Hence, some researchers have suggested reducing the pulpal inflammation before injecting anaesthesia to make it more effective. [10] For dental pain, non-steroidal anti-inflammatory drugs (NSAIDs) have a long history of clinical use. Their over-the-counter availability and efficacy in relieving pain and fever makes them popular drugs. Additionally, they have a low side effect profile at therapeutic doses. NSAIDs block the cyclo-oxygenase enzyme, thereby reducing prostaglandins. [11] This in turn, results in lower levels of inflammation. However, according to Aggarwal V et al [12], neither ibuprofen nor ketorolac caused any improvement in the success of pulpal anaesthesia. So, the present study was aimed at reducing the confusion amongst endodontists about whether or not to use premedication with IANB. In dentistry, there are rather few studies concerning the use of meloxicam and even fewer in endodontics. As meloxicam is a selective COX-2 inhibitor, it causes relatively less gastro-intestinal (GI) upset compared to other NSAIDs. It is widely used in the treatment of osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, and other rheumatologic conditions. [13] The current study was performed to compare the effect of placebo and premedication with ibuprofen and meloxicam, on the success of inferior alveolar nerve block in patients having symptomatic irreversible pulpitis.

MATERIAL AND METHODS:

The study consisted of 150 patients in the age group of 18-65 years consisting of 79 males and 71 females, in acute pain with mandibular molar teeth (first or second molar) diagnosed as acute irreversible pulpitis. Written informed consent was obtained from all human subjects who participated in the experimental investigation after the nature of the procedure and possible discomforts and risks had been fully explained. Patients were questioned regarding inclusion/exclusion criteria.

Inclusion criteria: Between the ages of 18 and 65 years; in good health; informed consent granted; vital mandibular molar teeth.

Exclusion criteria: Allergy to ketorolac and meloxicam; history of significant medical problem; gastrointestinal problems; syndrome of nasal polyps; angioedema or bronchospastic reactivity to aspirin or other nonsteroidal anti-inflammatory drugs (NSAIDs); taken central nervous system (CNS) depressants (including alcohol or any analgesic medications) within the last 48 hours; pregnancy; lactating; or inability to give informed consent. To qualify for the study, each patient had a vital mandibular tooth, and actively experiencing moderate-to-severe pain as determined by a Heft-Parker Visual Analogue Scale (VAS), and had a prolonged response to cold testing. Patients with no response to cold testing or periradicular pathosis (other than a widened periodontal ligament) were excluded from the study. Patients were randomly assigned to three groups with 33 patients in each group. Group I were administered placebo with sugar coated pills, Group II were given ketorol (10 mg), Group III were administered meloxicam (7.5 mg). Cold testing using Green Endo ice spray was done before administration of anesthesia to determine level of pain on a scale of 1-170 mm using Heft-Parker VAS score. Medication was given an hour before the anesthesia was administered. IANB was administered under aseptic conditions by using 2% lignocaine with 1:100000 adrenaline. The tooth was then isolated with a clamp and rubber dam and an endodontic access was performed after 15 minutes. There were three phases of the treatment: Access into dentin, access into the pulp chamber, and instrumentation of the canals. Each patient was instructed to rate any discomfort during endodontic treatment using the VAS.

RESULTS:

No patients reported with any untoward event within 48 hours. No significant differences were found in the age and sex among the patients in the three groups (Table 1, Fig 1). Significant difference was found between the placebo and premedication groups but no significant difference was found between the ketorol and meloxicam groups (P-value >0.05). The P-value was 0.001 fifteen minutes after anaesthesia, 0.001 during access preparation and 0.01 during instrumentation being <0.05 at all steps and thus statistically significant (Table 2). On the basis of these findings, null hypothesis was rejected. Overall success rates for the placebo, ketorol and meloxicam groups were observed to be 60%, 92% and 88% respectively. The difference can be clearly appreciated in Fig. 2. Thus, according to the present study, the use of premedication before anaesthesia is recommended in irreversible pulpitis cases.

Table 1: Shows age group and gender distribution of the patients studied for each group

Gender	Group 1 and %	Group 2 and %	Group 3 and %
Male	25 (50%)	28 (57.5%)	23 (45%)
Female	25 (50%)	22 (42.5%)	27 (55%)
Total	50 (100%)	50 (100%)	50 (100%)

Fig 1: Shows age group and gender distribution of the patients studied for each group

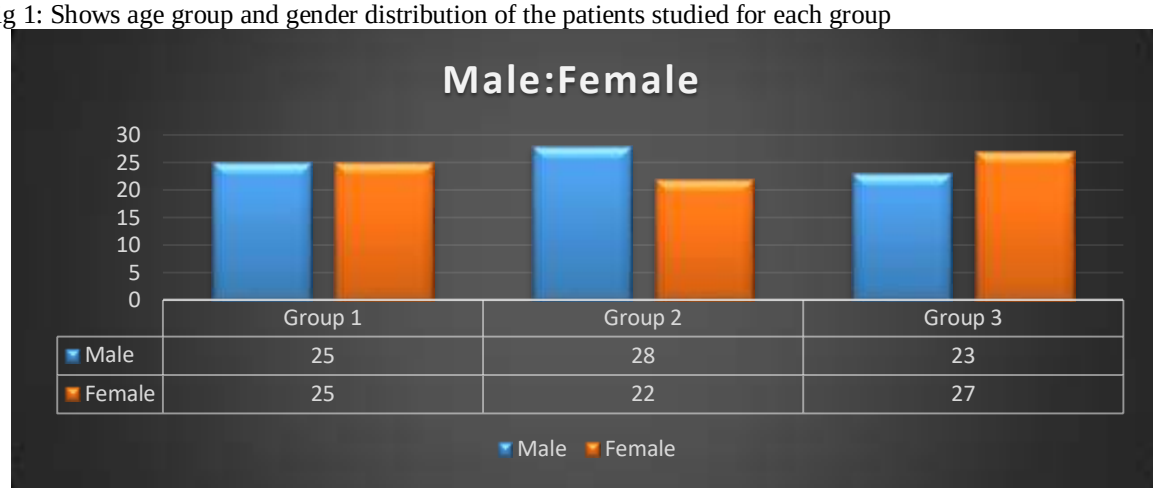
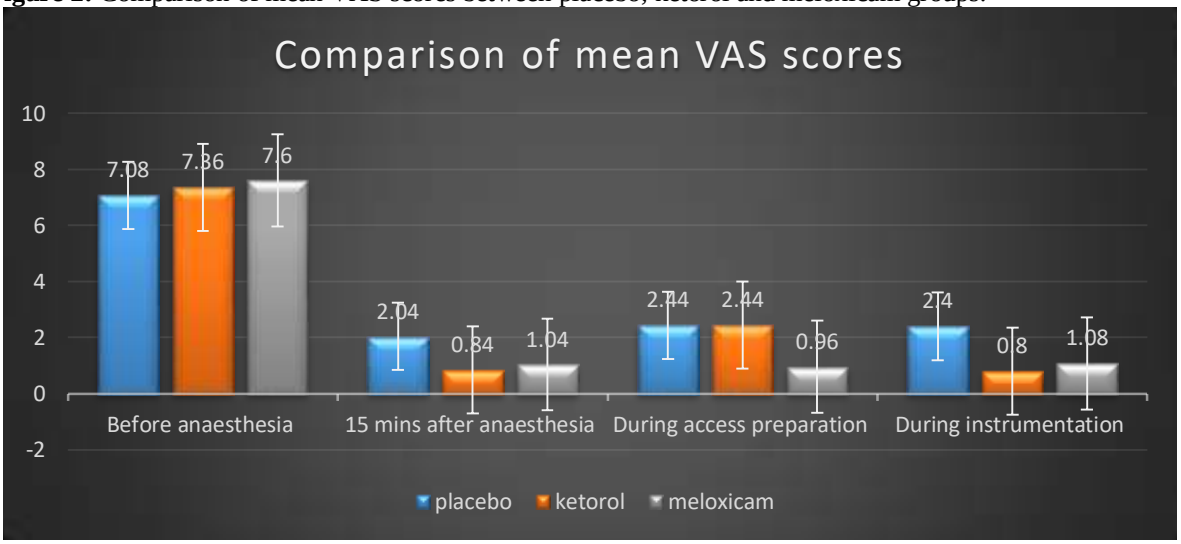


Table 2: Comparison of mean VAS scores before anaesthesia and steps during the procedure (mean±SD)

Group	Placebo	Ketorol	Meloxicam	p-value
Before anaesthesia (mean±SD)	7.08±1.41	7.36±1.38	7.60±1.50	0.442
15 mins after anaesthesia	2.04±1.17	0.84±0.80 1.04±0.79 0.001	1.04±0.79	0.001
During access preparation	2.44±1.55	2.44±1.55	0.96±1.2	0.001

Figure 2: Comparison of mean VAS scores between placebo, ketorol and meloxicam groups:



DISCUSSION:

The present study showed that premedication with NSAIDs (ibuprofen and meloxicam) notably improves the success rate of inferior alveolar nerve block in irreversible pulpitis cases. The age and sex of the patients were not significantly different in the three groups and so, did not affect the study results. In this study, 2% lignocaine with 1:80,000 epinephrine was used, being the most common local anaesthetic agent used in dentistry, with a long history of clinical success. It is also the agent used in most previous studies on the efficacy of anaesthetic techniques and solutions and allows comparison between results of these studies. Parirokh et al. (2010) speculated that the utilization of premedication in patients with spontaneous pain was non-beneficial due to the fact

that the prostaglandins have already been released and cause the formation of TTX resistant receptors responsible of anesthetic failure. They added that premedication can only be helpful in the enhancement of anesthetic effect in patients who have prolonged response to cold without any spontaneous pain. This raises a question in terms of inclusion criteria when testing the efficacy of premedication on IANB in patients undergoing irreversible pulpitis [14]. Nonsteroidal anti-inflammatory drugs (NSAIDs) are the most commonly administered group of analgesics used in dentistry. Their mode of action is to block the cyclooxygenase enzyme, thus lowering the levels of prostaglandins produced in the arachidonic acid pathway. Specifically, PG2 is the prostaglandin that has been shown to be effective in the nociceptor neurons by sensitizing the transmembrane voltage-gated sodium channels (VGSCs). The result of such an effect is high susceptibility of these channels to major inflammatory mediators, histamine and bradykinin. Painful episodes and hyperalgesia ensue with such an interaction and the effect of administered anesthetics is also hampered [15]. Consequently, prostaglandin suppression has been suggested as very important for the alleviation of painful symptoms [16]. The effect of premedication with NSAID has been widely studied and ibuprofen has specifically been preferred by either administering the medication alone or comparing it with other drugs [17, 18, 19, 20]. A recent meta-analysis on NSAIDs revealed that this group of medication can increase the efficacy of IANB; however, the anesthetic type, volume, or supplemental injections do not seem to have any effect. Thus, NSAIDs appear to be a group of drugs that deserve specific attention for facilitating the IANB anesthesia [21]. Meloxicam has rarely been used in endodontic studies. Solis et al [22] demonstrated that patients receiving single dose of 15 mg preoperative meloxicam had a better postoperative analgesia compared with those given 100mg of diclofenac, after third molar extractions. Being a selective COX-2 inhibitor, it has a lower side effect profile. A lack of dose-response relationship for GI adverse effects allows for a flexibility in meloxicam dosage in the 7.5-15mg range. The decreased gastrointestinal upset gives meloxicam an advantage over other NSAIDs as it can be used for a wider range of patients. Ketorolac was found to be significantly effective in enhancing anesthetic efficacy in a study by Yadav et al. [20]. However, this study not only focused on premedication but the type of anesthesia as well. The authors concluded that ketorolac premedication followed by an articaine IANB with buccal and lingual infiltrations caused significantly higher success compared to an articaine IANB and ketorolac, lidocaine IANB and Ketorolac, and a lidocaine IANB and infiltration. Therefore, it is difficult to make a direct extrapolation on the effect of premedication and make a definite statement as whether it was the premedication or the type of anesthesia that specifically influenced the overall result. Nevertheless, the study is promising to bring a recommendation to the delivery and selection of anesthesia in teeth with irreversible pulpitis. Saha et al. [23], on the other hand, compared diclofenac and ketorolac, two NSAIDs in the arylalkanoic acid group and reported results in favor of oral premedication with 10 mg ketorolac. They indicated that ketorolac resulted in significantly higher success in IANB in patients with irreversible pulpitis compared to 50 mg. diclofenac. These results were in compliance with those reported by Shaskirek [24]; however contradictory to those reported by Aggarwal et al. [19] who reported no significant improvement due to its use.

CONCLUSION:

The present study concludes that the use of NSAID premedication increases the efficacy of local anaesthesia in patients with irreversible pulpitis. However, to reach a consensus amongst dentists about whether to use or not to use premedication, more extensive studies need to be performed in future.

REFERENCES:

1. H. Hargreaves KMG and S. Seltzer, The Dental Pulp, Quintessence Publishing Co, 4th edition, 2002.
2. H. P. Cohen, B. Y. Cha, and L. S. W. Sp˚angberg, “Endodontic anesthesia in mandibular molars: A clinical study,” Journal of Endodontics, vol. 19, no. 7, pp. 370–373, 1993.
3. Nusstein, John, Al Reader, Robert Nist, Mike Beck, and William J. Meyers. "Anesthetic efficacy of the supplemental intraosseous injection of 2% lidocaine with 1: 100,000 epinephrine in irreversible pulpitis." Journal of endodontics 24, no. 7 (1998): 487-491.
4. Modaresi, Jalil, Omid Dianat, and Mohammad Ali Mozayeni. "The efficacy comparison of ibuprofen, acetaminophen-codeine, and placebo premedication therapy on the depth of anesthesia during treatment of inflamed teeth." Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology 102, no. 3 (2006): 399-403.
5. Drum, Melissa, Al Reader, John Nusstein, and Sara Fowler. "Successful pulpal anesthesia for symptomatic irreversible pulpitis." The Journal of the American Dental Association 148, no. 4 (2017): 267-271.
6. Sorensen, H., L. Skidmore, D. Rzasa, S. Kleier, S. Levinson, and M. Hendry. "Comparison of pulpal sodium channel density in normal teeth to diseased teeth with severe spontaneous pain." J Endod 30, no. 4 (2004): 287.
7. Jena, Amit, and Govind Shashirekha. "Effect of preoperative medications on the efficacy of inferior alveolar nerve block in patients with irreversible pulpitis: A placebo-controlled clinical study." Journal of conservative dentistry: JCD 16, no. 2 (2013): 171.
8. K. M.G. Hargreaves andF.H. E.Tay, Seltzer and Bender’s Dental Pulp, 2nd edition, 2012.
9. Huang, Jason Haitao, Johann G. Thalhammer, Stephen A. Raymond, and Gary R. Strichartz. "Susceptibility to lidocaine of impulses in different

somatosensory afferent fibers of rat sciatic nerve." Journal of Pharmacology and Experimental Therapeutics 282, no. 2 (1997): 802-811.
10. Ingle JI, Walton RE, Malamed SF. Preparation for endodontic treatment. In: Ingle JI, Bakland LK, eds. Endodontics. 5th edn. Hamilton: BC Decker, 2002;385.
11. Trowbridge, H. O. "Chemical mediators of the vascular response, Trowbridge HO, Emling RC." Inflammation-A review of the process- (1993): 27-42.
12. Aggarwal, Vivek, Mamta Singla, and Debipada Kabi. "Comparative evaluation of effect of preoperative oral medication of ibuprofen and ketorolac on anesthetic efficacy of inferior alveolar nerve block with lidocaine in patients with irreversible pulpitis: a prospective, double-blind, randomized clinical trial." Journal of endodontics 36, no. 3 (2010): 375-378.
13. Del Tacca, M., R. Colucci, M. Fornai, and C. Blandizzi. "Efficacy and tolerability of meloxicam, a COX-2 preferential nonsteroidal anti-inflammatory drug." Clinical drug investigation 22, no. 12 (2002): 799-818.
14. Parirokh, Masoud, Rezvan Ashouri, Ali Reza Rekabi, Nouzar Nakhaee, Abbas Pardakhti, Sara Askarifard, and Paul V. Abbott. "The effect of premedication with ibuprofen and indomethacin on the success of inferior alveolar nerve block for teeth with irreversible pulpitis." Journal of endodontics 36, no. 9 (2010): 1450-1454.
15. Henry, Michael A., and Kenneth M. Hargreaves. "Peripheral mechanisms of odontogenic pain." Dental Clinics 51, no. 1 (2007): 19-44.
16. Holstein, Andrea, Kenneth M. Hargreaves, and Richard Niederman. "Evaluation of NSAIDs for treating post-endodontic pain: A systematic review." Endodontic topics 3, no. 1 (2002): 3-13.
17. Modaresi, Jalil, Omid Dianat, and Mohammad Ali Mozayeni. "The efficacy comparison of ibuprofen, acetaminophen-codeine, and placebo premedication therapy on the depth of anesthesia during treatment of inflamed teeth." Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology 102, no. 3 (2006): 399-403.
18. Prasanna, N., C. V. Subbarao, and J. L. Gutmann. "The efficacy of pre-operative oral medication of lornoxicam and diclofenac potassium on the success of inferior alveolar nerve block in patients with irreversible pulpitis: a double-blind, randomised controlled clinical trial." International endodontic journal 44, no. 4 (2011): 330-336.
19. Aggarwal, Vivek, Mamta Singla, and Debipada Kabi. "Comparative evaluation of effect of preoperative oral medication of ibuprofen and ketorolac on anesthetic efficacy of inferior alveolar nerve block with lidocaine in patients with irreversible pulpitis: a prospective, double-blind, randomized clinical trial." Journal of endodontics 36, no. 3 (2010): 375-378.
20. Yadav, Meetu, Mandeep S. Grewal, Stutee Grewal, and Parul Deshwal. "Comparison of preoperative oral ketorolac on anesthetic efficacy of inferior alveolar nerve block and buccal and lingual infiltration with articaine and lidocaine in patients with irreversible pulpitis: a prospective, randomized, controlled, double-blind study." Journal of endodontics 41, no. 11 (2015): 1773-1777.
21. Corbella, Stefano, Silvio Taschieri, Francesco Mannocci, Eyal Rosen, Igor Tsesis, and Massimo Del Fabbro. "Inferior alveolar nerve block for the treatment of teeth presenting with irreversible pulpitis: A systematic review of the literature and meta-analysis." Quintessence International 48, no. 1 (2017).
22. Orozco-Solís, Mariana, Yazmín García-Ávalos, Celeste Pichardo-Ramírez, Francisco Tobías-Azúa, Juan-Ramón Zapata-Morales, Othoniel-Hugo Aragon-Martínez, and Mario-Alberto Isiordia-Espinoza. "Single dose of diclofenac or meloxicam for control of pain, facial swelling, and trismus in oral surgery." Medicina oral, patologia oral y cirugia bucal 21, no. 1 (2016): e127.
23. Saha, Suparna Ganguly, Sohini Jain, Sandeep Dubey, Shubham Kala, Abhinav Misuriya, and Devendra Kataria. "Effect of oral premedication on the efficacy of inferior alveolar nerve block in patients with symptomatic irreversible pulpitis: a prospective, double-blind, randomized controlled clinical trial." Journal of Clinical and Diagnostic Research: JCDR 10, no. 2 (2016): ZC25.
24. Jena, Amit, and Govind Shashirekha. "Effect of preoperative medications on the efficacy of inferior alveolar nerve block in patients with irreversible pulpitis: A placebo-controlled clinical study." Journal of conservative dentistry: JCD 16, no. 2 (2013): 171.