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ORIGINAL ARTICLE

Preemptive Analgesic Effect of Ibuprofen in 3rd Molar Impactions Surgery of Jaw

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ABSTRACT

Introduction: Ibuprofen is a propionic acid derivative that has analgesic, anti-inflammatory and antipyretic effects. It is well known that ibuprofen is effective in postoperative dental pain. It is more advantageous to use an analgesic agent pre-operative since this way prevents central sensitization of peripheral receptors which normally happens as a consequence of surgical trauma that intensifies postoperative pain.

Materials and Methods: A total of 60 cases with chief complaint of pain and recurrent pericoronitis caused by the 3rd molar impaction in the ages of 17-35 years and both the sex were taken. The patients who had a history of hypersensitivity to NSAIDs and peptic ulcer were excluded. Group A consisted of 600mg of Ibuprofen (oral) 1 hour before the procedure and group B consisted of 600mg of Ibuprofen (oral) 1 hour after the procedure. All the patients were provided with standard after surgery care. The measure of outcome was postoperative pain.

Results: The average age of group A patients was1: 26.53 years SD 4.64 and group B was 1: 27.53 years SD 4.71. Most of the patients 31 (51.67) were aged between 26 to 35 years. The sample size was 60 (41 (68.33) males and 19 (31.67) females) males to females ratio 2:1. Pre-emptive Group A (pre-emptive group) recorded a mean post-operative pain of 1.97:1.76 and post-operative Group B recorded a mean post-operative pain of 4.00:1.44 (p-value = 0.0001).

Conclusion: The conclusion made by the current study has been that preemptive analgesic effect of ibuprofen is superior in 3 rd molar impaction surgery compared with post-operative group.

Keywords: third molar surgery, preemptive ibuprofen, pain.

INTRODUCTION

One of the most prevalent teeth that are present in the oral cavity that are affected is the mandibular 3rd molar so that, the removal of the affected impacted 3rd molar, is a common procedure in the surgery in maxillofacial surgery[1,2]. At least 1 impacted 3rd molar can occur in 33% of total population.

Impaction refers to a partially erupted or unerupted tooth when the eruption pathway into occlusal plane is blocked by another tooth, bone, or soft tissue[1] The most widespread impacted tooth is the mandibular third molar. Third molar impaction has a range of prevalence, and can be prophylactic (or therapeutic) in patients with issues of impacted teeth[3] Tooth extraction Most third molar surgeries are carried out without complication. It can, however, cause painful symptoms, swelling, and disorders that are temporary or permanent, such as trismus and paresthesia[4]

In the initial 24 to 48 hours, 93% of the patients report severe pain. Limited mouth opening is sometimes linked to pain because of inflammation. Pain after surgical extraction is regarded as a gold standard model to evaluate the effectiveness of analgesics in clinical trials during the past two decades[5-7] Anti-inflammatories including nonsteroidal anti-inflammatory drugs (NSAIDs) either preoperative (preemptive analgesia) or postoperative should be considered to reduce pain, swelling and trismus during the postoperative period.

Although there has been progress in anaesthesia and understanding of pain management, it is no secret that the phenomenon of pain after surgery removal of third molar remains a common occurrence and has been highlighted in numerous studies[8-10]. Ibuprofen is a cheap and common analgesic agent that is regularly administered during maxilla facial surgery. Not many studies across the borders have demonstrated that better postoperative pain management can be accomplished with the preoperative use of ibuprofen. But yet there is no article that has evaluated its effectiveness on our local people. The purpose of the study is to determine the utility of preoperative ibuprofen to balance the effects of postoperative pain after third molar impaction surgery. In case our research findings reveal that better postoperative control is achieved by the preoperative use of ibuprofen, then it will be regularly administered to all the patients before third molar impaction surgery that will ultimately lead to the improved control of postoperative pain and general morbidity that is linked with the procedure.

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MATERIALS & METHODS

A randomized controlled trial was conducted at the department of Oral and Maxillofacial Surgery, Bolan Medical Complex Hospital, Quetta, Balochistan from May 2022 to May 2023. Sample size was calculated by using WHO sample size calculator keeping the following parameters: Significance level at 5%, power of test at 80%, population standard deviation 7.64%[5]

Sample size: sixty patients (n=60) where 30 patients in each group. Consecutive sampling technique was chosen and it was non-probability. In this case, the patients presented with the chief complaint of pain and frequent pericoronitis caused by the third molar impaction as observed on a clinical examination. Candidate patients with extraction of third molar impaction age of 17-35 years old were excluded. Patients who took analgesics in the last 2 weeks were also excluded (any purpose). Patients with hypersensitivity to Non-Steroidal Anti-Inflammatory Druges (NSAID) and pregnant patients were also excluded.

The hospital ethics committee was consulted and given permission and approval to conduct the study. Patients meeting the inclusion criteria were recruited in the study. The entire procedure was explained to the patient and informed written consent was signed. Oral and maxillofacial department of Bolan medical complex, Quetta was used to enroll patients. Short-term history and physical examination along with investigations were conducted. A random distribution was made of the patients into Group A (pre-emptive group) and Group B (postoperative group) of 30 patients each. Group A patients were given 600mg of Ibuprofen (oral) 1 hour before the procedure and group 2 patients were given Ibuprofen 600mg (oral) 1 hour after the procedure. Third molar impaction surgery was done through a standardized surgical procedure, where a buccal mucoperiosteal flap was raised, distobuccal bone guttering and removal of the tooth done by the

same surgeon who was blinded of intervention. The surgery was done under 2% Xylocaine that acted as an anesthetic agent consisting of lignocaine hydrochloride 1: 200, 000 epinephrine. The patients had better dental block and long buccal block nerve block. All the patients were provided with standard postoperative care. Outcome was measured according to the description of outcome in operational definition as postoperative pain.

Statistical Analysis

All the accumulated data was calculated with the help of computer software IBM-SPSS version 23. Quantitative data such as age, BMI and VAS pain score were calculated in mean + standard deviation. Gender qualitative data were given in the form of frequency and percentage. Both, the groups (preemptive and postoperative ibuprofen), were compared in terms of mean VAS score of postoperative pain. T-test was used to compare the two groups of students and P value less than 0.05 was calculated to be statistically significant. Stratification regulated effect modifiers such as age, gender and BMI groups. Post stratification t-test was used and P value of less than 0.05 was taken to be significant.

RESULTS

The age of the participants in the study was 17 to 35 years and the mean age was 26.69 4.65 years. The average age of group A patients was 26.53 years and the group B patients were 27.53 years. Most of the patients 31 (51.67) fell in the age range of 26-35. Of 60 patients 41 (68.33) males and 19 (31.67) females with male to female ratio of 2.16:1. Mean BMI was 28.48 ± 2.92 kg/m2.

The mean post-operative pain in Group A (pre-emptive group) was 1.97 + 0.76 and in Group B (post-operative group) was 4.00 + 1.44 (p-value=0.0001). Table 1 presents the stratification of post-operative pain according to age groups and it indicated that there is a significant difference in the mean post-operative pain in all the age groups in each group. Table 2 shows the stratification of post-operative pain in relation to BMI.

Table 1: Stratification of post-operative pain with respect to age groups.

Age of patients (years)	Group A (n=30) Post-operative pain		Group B (n=30) Post-operative pain		P-value
	Mean	SD	Mean	SD	
17-25	1.88	0.81	4.08	1.50	0.0001
26-35	2.07	0.73	3.94	1.43	0.0001

Table 2: Stratification of post-operative pain with respect to BMI.

BMI (kg/m^2)	Group A (n=30) Post-operative pain		Group B (n=30) Post-operative pain		P-value
	Mean	SD	Mean	SD	
≤27	1.82	1.08	3.80	1.23	0.001
>27	2.05	0.52	4.10	1.55	0.0001

DISCUSSION

Pain is one of the factors that can hardly be associated with dental treatment. Their existence or even the fact that they may be experienced can cause inexhaustible responses, including fear and anxiety which may directly disrupt the safety of seeking a specific treatment. Moreover, dental procedures eliciting the highest level of fear in the prospect of experiencing pain are the surgical procedures, specifically the ones of implantology.

The idea of preemptive analgesia (PA) to create a lower level of postoperative pain was founded on a body of experimental animal research, which showed the central nervous system plasticity and sensitization due to nociception. Administration of analgesics prior to the occurrence of painful stimuli in order to prevent postoperative pain (hyperalgesia) or to reduce the dose of analgesic that is required during the postoperative period in comparison to that which is required when the pain stimulus has occurred is the basic principle of the PA[11,12].

This has been done with three types of analgesic medications [blockages with local anesthetics, non-steroidal anti-inflammatory drugs (NSAIDs) and opioids) either singularly or in combination. A number of studies have been carried out in PA especially in surgeries involving extraction of third molar periodontal surgeries, and limited number of studies in implant dentistry, and with mixed results. Moreover, various drugs have been tried in PA but without agreeing on the optimal protocol to use concerning the drug, posology and duration of exposure to the drug[13].

Research has established that there is a great inclination towards the use of Ibuprofen in the treatment of pains associated with dental issues or dental surgeries. Ibuprofen, which is also referred to as ibu-phenyl-propionic-acid, is a medicine belonging to the category of NSAIDs and is an anti-inflammatory agent by non-selectively blocking cyclooxygenase 1 and 2 thereby preventing the formation of pro-inflammatory mediator through the arachidonic acid cascade. This study was done to establish the analgesic properties of preemptive ibuprofen and postoperative ibuprofen in terms of average pain score after extraction of impacted third molar[14].

The age of this study was 17 to 35 years with mean age of 26.69/4.65 years. Group A patients were of mean age 26.53 +/- 4.64 years and group B patients had mean age 27.53 +/- 4.71 years. The mean age of the patients was 31 (51.67) with majority of the patients falling in the 26-35 age group. Then there were 60 patients of which 41 (68.33) were males and 19 (31.67) were females with male to female ratio being 2.16:1. Mean post-operative pain in Group A (pre-emptive group) was 1.97 + -0.76 and that of Group B (post-operative group) was 4.00 + 1.44 (p-value = 0.0001). Recently, Kumar H et al performed a randomized controlled trial, aimed at investigating the effect of ibuprofen use as a pre-emptive analgesic on impacted third molar post extraction pain and they have found that the mean time of first episode of pain was longer in preemptive ibuprofen group than in postoperative ibuprofen group (217 ±11.8 VS 152 ± 7.2 minutes; p=0.0002). Besides, the level of pain as measured on VAS scores were also lower in patients who received preemptive Ibuprofen (32.9 +-8.18 VS 54.7 +-7.10mm; p=0.0003).

It was established in a systematic review131 that various clinical trials were performed aimed at supporting the effectiveness of PA in the clinical dental practice, but, they demonstrated controversial outcomes. It is not possible, according to Kissin114 to identify a preemptive effect in comparative studies of groups where the analgesic is used only during the pre-incisional and post-incisional period because of the complexity in the central sensitization mechanisms and the technical challenges of the studies, which it is believed will need the pre, trans and postoperative analgesic regimen. It has already been established by numerous studies that preemptive analgesia with placebo is less than that encountered when comparing it with anti-inflammatory drugs in managing the pain following the extraction of mandibular third molars.[15,16]

In a prospective double blind randomised double blinded clinical trial, Kaczmarzyk et al investigated whether ketoprofen given 60 min pre-surgery during lower wisdom teeth extraction has a greater effect on postoperative analgesia than ketoprofen given 60 min post operative or placebo and they found that Ketoprofen given after lower wisdom teeth extraction gives better pain control than ketoprofen given before the surgery or placebo.[17]

Hypersensitivity, hyperalgesia, allodynia and abnormal paresthesia with the onset of pain by noninvasive stimuli can be provoked by kato et al. comparing presurgical and end-of-surgery administration of flurbiprofen in patients undergoing oral surgery, including fracture of the fractured jaw bone, and removing tumours under general anesthesia.138 This has been credited to the integration of peripheral somaticization related to the reduced threshold of nociceptors and central somaticization related to the enhanced excitation of central nervous system.[18,19]

These sensory disturbances are also believed to be related to intractable postoperative pain. Peripheral sensitization occurs by local tissue damage and inflammation and a variety of sympathetic terminal-derived chemical mediators (hydroxyl ions, noradrenaline, bradykinin, histamine, potassium ions, prostaglandins, purines, cytokines, 5-HT, leukotrienes, nerve growth factor and

neuropetides) leading to increased excitability of dorsal horn neurons, after which it causes central sensitization. With central sensitization, the signals that are sent via A2 fibers of low-threshold mechanoreceptors are perceived at the high excitability dorsal horn neurons as pain. Also, A8 fibers and C fibers of the nociceptors are under peripheral sensitization, which promotes and maintains pain. When central sensitization has been achieved, the patients are no longer receptive to analgesics.[20]

Conversely, preemptive analgesia is a concept that reduces the pain experienced after surgery by eliminating central sensitization before the surgery. We shall take a simplistic model of postoperative hyperesthesia. Postoperative hyperesthesia is prolonged and improvement takes even more time after the creation of central sensitization as a result of postoperative damage to surgical tissues. But, when preemptive analgesia is administered pre-surgical, central sensitization is inhibited and hyperesthesia after the surgery does not take place. Conversely, central sensitization caused by surgery is established in case of the provision of only postoperative analgesic treatment. Postoperative hyperesthesia is therefore suppressed only in the short run.

CONCLUSION

This research study found out that preemptive analgesic action of ibuprofen is more successful in 3rd molar impaction surgery rather than after the operation. In that regard, we would advise that preemptive administration of ibuprofen be practiced in all patients who undergo mandibular third molar surgery so as to decrease the pain and morbidity.

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