IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 13, Issue 1 Ver. V. (Jan. 2014), PP 40-45
www.iosrjournals.org

" Effects of administration of diclofenac sodium with tramadol and diclofenac sodium with dexamethasone on pain, swelling and trismus following third molar surgery."

Dr. Ajay Kumar Pillai; Dr. K Kavitha; Dr. Gareema Sandhu; Dr. Saksham Nahar; Dr. Vinish Vishnu;

Department of Oral & Maxillofacial Surgery; People's University, Bhopal, Madhya Pradesh, India.
Consultant Dental Surgeon; Chowdhary Hospital, Bhopal, Madhya Pradesh, India.
People's University, Bhopal, Madhya Pradesh, India.
PG student, Department of Oral & Maxillofacial Surgery; People's University, Bhopal, Madhya Pradesh, India.
lecturer, Department of Oral & Maxillofacial Surgery; People's University, Bhopal, Madhya Pradesh, India.

Abstract
Background: *The apparent interactions between the mechanisms of action of non-steroidal anti-inflammatory drugs (NSAIDS) and steroids suggest that co-therapy may provide beneficial in inflammation and pain relief in the absence of side effects. The aim of the study was to compare the effect of co-administered diclofenac sodium and dexamethasone with diclofenac sodium with tramadol on the postoperative pain, swelling and trismus after surgical removal of third molars.*
Patients and Methods: *A prospective randomized study was conducted at the Chowdhary hospital Bhopal. A total of 100 patients (age range: 20-35 years), with impacted third molar who underwent surgical removal were randomly allocated to two treatment groups. Group A of 50 patients who were given diclofenac sodium (50 mg Oral before and after surgery and dexamethasone (prophylactic 8 mg and postoperative 4 mg IV 8th hourly) , and Group B of 50 patients who were given diclofenac sodium(50 mg Oral before and after surgery) with tramadol(50 mg orally).*
Postoperative pain was assessed with a visual analogue scale at 8th hourly and 3rd and 7th postoperatively day (POD). Swelling was measured at 3 and 7th POD Maximal interincisor distance was measured at 3 and 7 POD. Patient treated with diclofenac sodium + dexamethasone showed lower pain score, larger postoperative mouth opening and less swelling compared to diclofenac sodium with tramadol.
Results: *Co-administration of dexamethasone and diclofenac sodium was significantly superior to diclofenac with tramadol for the relief of pain ($P < 0.05$), and facial swelling and post operative trismus up to post-operative 48 hour ($P < 0.05$).*
Conclusion: *This study illustrates enhanced effects of co-administered dexamethasone and diclofenac sodium on short-term post-operative pain and swelling, compared to diclofenac with tramadol in third molar surgery.*
Key Words: *Preemptive analgesia, Post-operative day care pain control,tramadol, dexamethasone, diclofenac sodium.*

I. Introduction

Third molars are the most frequently impacted teeth because of their particular topography, phylogeny and ontogeny. They are directly or indirectly associated with numerous disorders in the mouth, jaw and facial regions. Therefore, the extraction of third molars is one of the most common surgical procedures for Oral and Maxillofacial surgeons[1]. Clinically impacted teeth may give various presentation including pain, food impaction, cheek bite etc. Patients often associate extraction or dis-impaction with pain and swelling, there by delaying the treatment and hindering the resolution of the diseases.Pain prevention is thought to be more efficient than treatment of pain after it has been induced[2].

During surgery, tissue damage, inflammation and other noxious stimuli trigger a range of changes in the peripheral nervous system. Metabolites such as arachidonic acid and prostaglandins are produced locally at the site of cell injury. These metabolites mediate the inflammatory process. The effectiveness of preoperative administration of Non Steroidal Anti Inflammatory drugs (NSAIDs) is well documented in the literature[3]. Preoperative analgesia that can prevent postoperative pain is of great interest in any type of surgery. NSAIDs are routinely used drugs for the control of postoperative pain of moderate to severe pain. NSAIDs alter peripheral nociceptors by reducing the local concentration of these allogenic chemicals[3]. The mechanism of action of NSAIDs is by inhibiting COX-1 and COX-2 enzymes there by preventing synthesis of prostaglandians.

Pharmacological management of pain involves the administration of medications which include: opioid analgesics, non steroidal anti inflammatory drugs, glucocorticoids and alpha 2 agonits.
Clinical studies have reported conflicting results regarding the efficacy of preemptive analgesia. A meta analysis reported by Moiniche et al.,in 2002 reported that there is no clinical evidence to support the use of preemptive analgesia in control of postoperative pain control. But in contrast with the above study ,Ong et all in 2005 reported that preemptive local anaesthetic wound infiltration and nonsteroidal antiinflammatory drug (NSAID) administration improve analgesic consumption and time to first request for rescue analgesic. Potential reasons for these contradictory results may include differences in analgesic methods, the complex and multifactorial nature of pain, and the ethical constraints involved when studying pain in human patients (Hariharan et al., 2009)[4].

Therefore, the aim of this prospective, randomized study was to compare the preemptive analgesic effects of co-administered Diclofenac sodium + dexamethasone and Diclofenac sodium + tramadol on the post operative management of pain, swelling and trismus following third molar surgery

II. Material And Methods

The study protocol was explained for each subject and those who were cooperative were selected.100, cooperative patients, who reported to the Chowdhary Hospital, Bhopal, from January 2013 to December 2013,were enrolled in the study after obtaining the hospitals Ethics Committee approval. Informed written consent was obtained from each patient. Out of
100patients 50 patients were male and 50 patients were female. They were aged between 20-35 years. Subjects below the age of 20 years were excluded, as the eventual outcome of third molar eruption is still uncertain. Only patients with a full compliment of teeth were included. Those with missing second molars were excluded. Other exclusion criteria were any pathosis or trauma to the jaw. Patient who presented with history of allergy to lignocaine; suffering from acute cellulites, pharyngitis, blood dyscrasias, tumour of oro-pharyngeal region, vascular malformation, previous history of drug allergy or with peptic ulcer and inadequate literacy, were excluded from study. Those impacted mandibular third teeth which were in class II position B third molar surgery requiring bone removal according to the Pell and Gregory were included in our study.
Orthopantomograms were taken for all subjects in order to assess the level of eruption, angulation of the impacted third molar.
Patients were randomly allocated to two groups of 50-50 patients (Group A and group B) by a trained dental hygienist who was blind to the treatment procedure.
Pain measurement:

Every patient was asked to rate his/her pain on a visual analog scale(VAS). Patients were informed about the Visual Analogue Scale[4] (VAS, 0 – 4 mm), Verbal Pain Scale (VPS, no pain: 0, mild pain: 1, moderate pain: 2, severe pain: 3, and very severe unbearable pain: 4) in the preoperative period.
Measurements of Facial swelling:
Pre & post operative cheek swelling was recorded clinically from the outer skin surface while teeth in normal intercuspation position. Swelling was carried out by measuring the distance from corner of mouth to ear lobe using a thread in the horizontal axis and outer canthus of the eye to the angle of mandible for vertical axis. The mean of these values obtained preoperatively were subtracted from those obtained post operatively on designated follow-up days.
Measurements of trismus:
Trismus was calculated as measurement between the upper and lower central incisor when patients were asked to open the mouth. Trismus was expressed as the reduction in the postoperative inter-incisor distance of each patient. It is calculated with a scale and in millimetres.

Surgical procedure

Radiographs were evaluated in all the patients for assessing the position, type, and difficulty index. All procedures were performed by a same surgeon. A single examiner performed all clinical measurements at 8th hourly,3rd and 7 postoperative day.

All patients received standard dose of antibiotics orally (Augmentin 625 mg 3 times daily) 1 hrs before surgery continuing for the period of 5 days postoperatively. Patients in group A received diclofenac sodium (50mg) orally 30 minutes preoperatively, and thereafter 50mg every 12th hourly for five days + dexamethasone (8mg) parenterally 1hour preoperatively and 4 mg 6 hours postoperatively in two doses and Group B received diclofenac sodium (50mg)+ tramadol (50mg) orally preoperatively and thereafter, every 12th hourly for five days alone. Antibiotics were same in both the groups. All patients were also instructed to do intermittent ice application for the first 24 hours postoperatively and to avoid any intake of food up to two hours. The patient could have cold and soft food thereafter. The patients were also asked not to use any other drug for his/her pain

until the first 8 hours after tooth extraction and to report the severity of pain on 8th,3rd and 7 postoperative day after dental extraction on visual analogue scale.

The postoperative complication was assessed as:

1) Pain 8^{th} hrs postoperatively, 3^{rdt}& 7^{th} day postoperatively
2) Swelling 3^{rd} & 7^{th} day postoperatively
3) Trismus 3^{rd} & 7^{th} day postoperatively

Collected data were subjected to different types of statistical analyses such as χ^2 test, *t* test and analysis of variance approach

III. Results:

The baseline demographic characteristics were similar among groups.

Patient base line characteristics between groups:

Characteristics	Group A	Group B
Age (years)	26 ± 5	28 ± 4
Gender: Male	29	28
Female	21	22
Duration of Surgery	27.15 ± 6.21	25.26 ± 5.78
Among the 100 patients, no major difference was found in the average of Age/ Sex/ Duration of Surgery		

Overall a total of 100 patients 54% were male and 45% were female, who completed the study were included in the analysis{flow chart 1}. The mean age of the participants was 28.6±3.6years.The radiographic analysis (OPG) was taken for all the patients which showed the majority of the case was in mesioangular position. The use of intraoperative anaesthesia was limited to adrenaline administered with lignocaine hydrochloride (2% lignocaine hydrochloride with 1:100,000 adrenaline).

Flow Chart 1

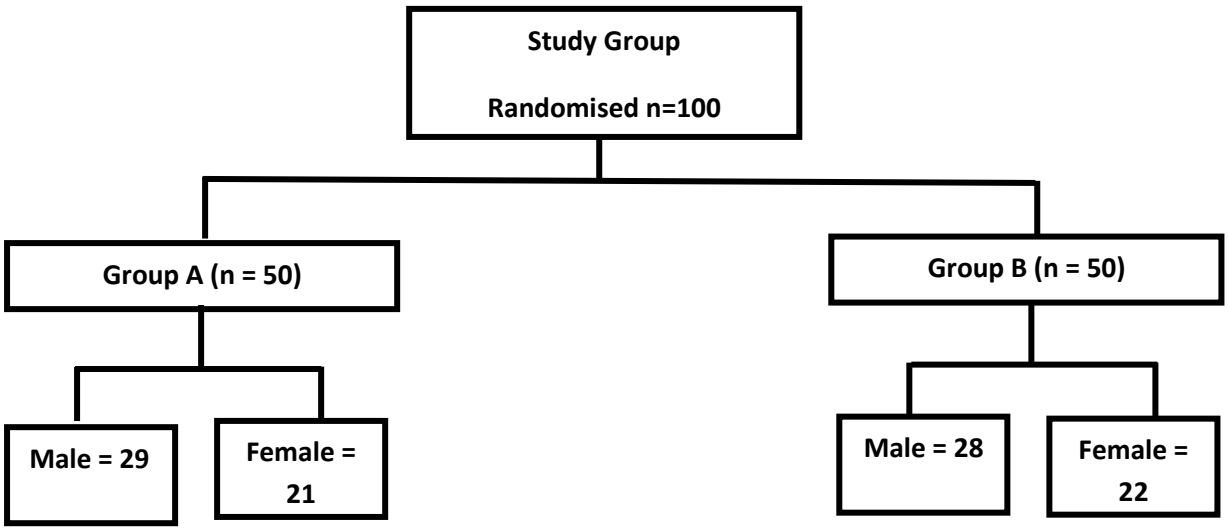

Table 2 presents chart on postoperative pain intensity. The overall analgesic efficiency of the study drugs over the period of 8^{th} hourly, 3^{rd} and 7^{th} POD, were measured by reduction in pain intensity using visual analog scale. For group A, the mean pain score on day 1 (8^{th} hourly), 3^{rd} and 7^{th} day post operatively was significantly lower than in group B. ($p<.001$). At the end of 8 hours of surgery, group B showed 6.41±1.64 with only 27% of patients showed reduction in the severe pain intensity, whereas group A pain score 4.25±1.02 with 49% of the patients showed reduction in the severe pain intensity and was found to be statically significant.

Table 2

Mean pain score SD using VAS

Study Period	Group A	Group B	P value
Day 1 (8^{th} hour)	6.41±1.64	4.25±2.02	0.001
Day 3	1.66±1.23	1.41±1.46	0.281
Day 7	0.27±0.51	0.01±0.15	0.144

On day 3 pain score was 1.66±1.23 with 78 % reduction in pain intensity in group B and 1.41±1.46 with 83% reduced pain intensity in group A.
On day 7, the pain score was 0.27± 0.51 with 96 % reduction in pain intensity in group B and 0.01±0.15 with 100% reduced pain intensity in group A.

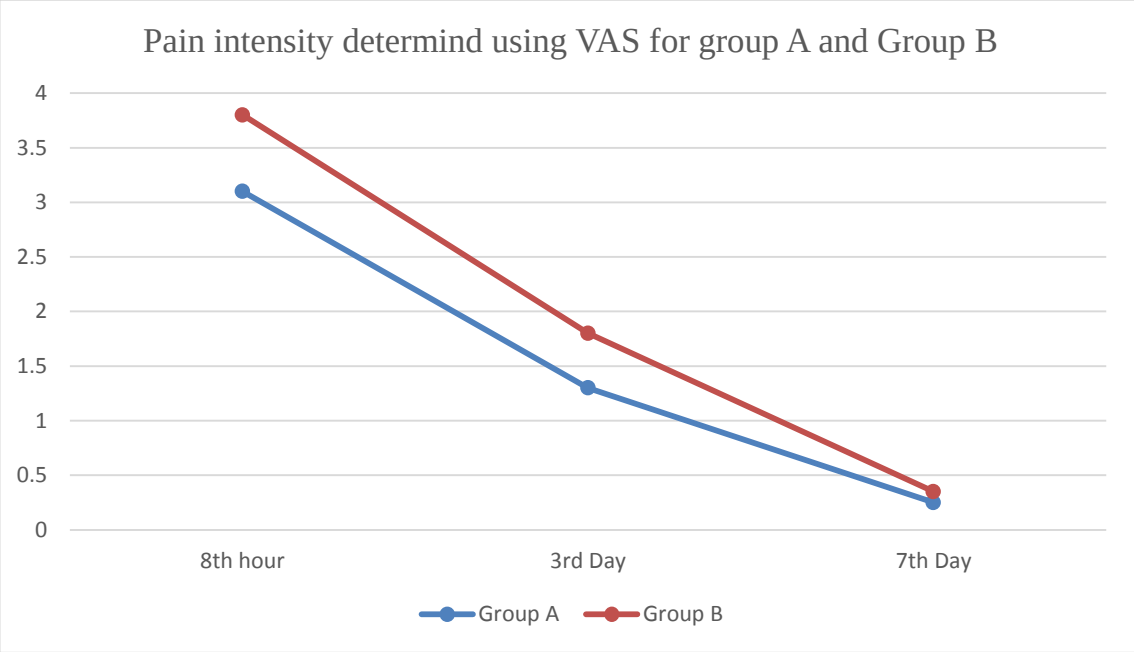

Table 3 presents chart on postoperative facial selling. On day 3rd day postoperative day there was significant reduction in patient's facial swelling noticed in patients group A than in group B. However there was not much difference in facial swelling in both the groups in 7th postoperative day.

Table 3

Facial swelling at day 3 and day 7 in Group A and B

	Pre-operative	Day 3	Day 7
Group A	Normal	Mild	-
Group B	Normal	Gross	-

There was significant difference between the treatment groups with regards to reduction in mouth opening (Table 4). Limited mouth opening is called as trismus. Significant trismus was noticed in patients of group B than that of group A. The difference in the maximum inter-incisor distance between the preoperative period, 3rd POD and 7th POD was assessed with paired sample t test. Trismus was worst on 3rd POD in group B compare to that of Group A. But on 7th POD both the groups shown more or less same mouth opening.

Table 4

Difference between maximal interincisor distance (mm) prior to surgery and those made on 3rd and 7th day post operatively

Day	Group A	Group B
Day 3	30±10.2	15±6.8
Day 7	36.0±10.2	30±7.2

The incidence of side effects, especially the epigastric pain, nausea ,any adverse events were minimal in both the groups {Table 5}.Only 6 out of 50 patients in group A and 8 out of 50 patient in group B complaints of gastritic.

Table 5

Adverse Event Profile of Study Drugs

Adverse Events	Group A	Group B	Total
Nausea	-	2	2
Gastritis	6	8	14
Epigastric Pain	1	1	2
Hypersensitivity reaction	-	-	-
Dizziness	-	-	-

IV. Discussion

Management of impacted third molars or extraction is the most common and perhaps the most controversial surgical procedure in Oral and Maxillofacial surgery. A large population of individuals may have one or more impactions.

The most frequent complication after surgical removal of impacted third molar are Alveolar Osteitis, Neurological damage, Swelling, Postoperative Pain and Trismus. In a national survey conducted in USA by Apfelbaum et al[6]. It was reported that most of the patients experience acute pain after surgery. With increasing attention being given to successful postoperative pain management, development of newer analgesics with potency and fewer adverse effects and use of balance analgesia plays a prominent role. Post operative swelling may cause facial asymmetry, marked trismus and un bearable pain. Steroids undoubtedly decreased post-operative swelling, though several studies have shown the efficacy of steroid in the reduction of post operative swelling following third molar surgery, but the selection of appropriate drug, its proper dosage and route of administration is still discussable[7].

In 1949 Hench reported the use of hydrocortisone and stated that it might prevent inflammation following oral surgery. Corticosteroids such as dexamethasone and methylprednisolone due to it's purely glucocorticoid effects suppress inflammatory process.

It has been reported that any form of tissue injury evokes an inflammatory response. Cortisol and the synthetic analogue of cortisol have the capacity to interfere with the physiologic processes of inflammation and, thus, suppress the development of inflammatory reaction. NSAID inhibit the biosynthesis of prostaglandins by inhibition of the cyclo-oxygenase enzyme system. The pharmacological action of both the drugs are very much discussed in literature. Preventive strategies for postoperative management of pain and inflammation are based on the known ability of NSAIDs to block the arachidonic acid cascade. When NSAIDs are administered preoperatively, absorption and distribution of the medication may occur before the initiation of tissue trauma, the ensuing synthesis of prostaglandins and the subsequent inflammatory response. Prevention of the inflammatory response may decrease the sequelae of tissue trauma; especially the accompanying pain . Diclofenac sodium has been shown to be useful in controlling postoperative pain after removal of third molars. Diclofenac K is known to possess both analgesic and anti-inflammatory effect. Due to its anti-inflammatory effects, the administration of dexamethasone may synergize the anti-inflammatory effect of cataflam and contribute to the reduction of inflammatory exudates as well as edema and pain. Therefore the co-administration of diclofenac sodium and dexamethasone may be expected to reduce post-operative pain more than that achieved with diclofenac sodium with tramadol [4,7,9].

The present study assessed the clinical effect of diclofenac sodium with dexamethasone and diclofenac sodium with tramadol on pain, facial swelling and trismus. This study broadens knowledge on preemptive analgesia as a form of treatment for postoperative pain following third-molar surgery. Majority of patients in this study were male (54%). In this study out of all impacted mandibular third molars, majority (45%) were mesioangular impactions.

The observations were showing that pain was evident in all cases. Regardless of the drug combination used, the pattern of postoperative pain has been reported to increase between the post-operative days 1 and 3, after which the symptoms subside gradually within one week[3-6]. Our results confirm this observation.8th hourly P.O.D there were 42.60% of subjects who reported with complaint of severe pain, 10.45% complained of moderate pain & 8.96% complained of mild pain. On the 7th postoperative day there were 92.54% of patients who reported with nil to mild pain & 7.46% patients who had mild pain. A similar study was conducted by *HiraAyazet al*[8] reported 21.7% subjects with severe pain, 20.5% with moderate pain, 37.7% with mild pain and 11.3% with no pain on the 3rd postoperative day. By the 7th postoperative day 43.4% had no pain, 39.6% with mild pain, 13.2% with moderate pain and 4% with severe pain.

The comparison of pain intensity postoperatively between the diclofenac sodium with dexamethasone and diclofenac sodium with tramadol group at 8th hourly showed significant difference between the two groups ($P < 0.05$), indicating an enhanced analgesic effect of diclofenac sodium when administered in combination with dexamethasone. This finding corroborates with those of previous reports [2,4,6]. Latter on the VAS values decreases significantly over time in both the groups.It is also reported that few of the authors who combined the use of ibuprofen and methylprednisolone for pain relief, concluding that this combination has good analgesic and anti-inflammatory action [9].

One of the short term complications of the third molar surgery in swelling. It is noteworthy to mention herein that the cheek swelling following third molar surgery is diffuse in different planes and is very difficult to measure accurately. After a surgical procedure it is a normal physiologic response of the tissue that leads to the inflammatory swelling. On the 3rd postoperative day we found 43.28% of subjects who complained of severe swelling &13.43% of subjects who had mild swelling.

By the 7th postoperative day 98.51% of subjects who reported with complaint of nil to mild swelling. As swelling is one obvious postoperative complication, but it generally gets subsided by itself on the 7th

postoperative day in majority of subjects. The earlier study conducted by J.J Ten Bousch[8] was also consistent with our study.

In our study we noticed that the co-administration of dexamethasone and diclofenac sodium preoperatively and postoperatively, produced a clear reduction in postoperative pain and cheek swelling. The mean increase in facial swelling in days 3 and 7 in Group I (dexamethasone- diclofenac sodium combination) was significantly less than that of Group II (diclofenac sodium with tramadol). This result shows that co-administration of dexamethasone + diclofenac sodium enhances the control of postoperative facial swelling. This study was in corroborates with study conducted by Huffman G[11] and Babatunde Olamide Bamgbose [5] .

Trismus or difficulty in opening the mouth is often the result of surgical trauma and is secondary to masticatory muscle inflammation following lower third molar surgery .The postoperative patients may feel jaw stiffness with difficulty to eat normally. Trismus gradually resolves and the ability to open the mouth returns to normal by 7th to 10th day postoperatively[3].

There were about 92.54% of subjects who reported with severe Trismus on 3rdpostoperative day & 7.46% of subjects were having moderate difficulty in mouth opening.

By the 7th postoperative day the majority 83.58% regained their normal mouth opening where as 16.42% had mild Trismus..

In the study conducted by HiraAyaz et all [8] they had 81.1% of subjects with Trismus on the 3rd postoperative day. In their study majority subjects regained their normal mouth opening by the 7th postoperative day. Our study was in contrast with this study.

Independent T-test did show significant difference in reduction of mouth opening (trismus) between the study groups (P > 0.001). Our results indicate a positive clinical association between the adjunct use of dexamethasone and postoperative recovery of trismus in third molar surgery.

In our study we noticed that the potency and dosage of dexamethasone within the first 24 h (total of 16 mg, including pre-operative dose) was adequate to enhance the efficacy of diclofenac sodium. Intravenous administration of dexamethasone, as done in the present study, enhances earlier bioavailability in comparison to oral administration. Such treatment with high dosage does not impair adrenal function. Additionally, intravenous administration of dexamethasone prior to third molar surgery bears no detrimental impact on wound healing, even in patients predicted to be at high risk for delayed clinical recovery [12].

The combination of preemptive diclofenac sodium. and dexamethasone was more effective in the control of postoperative swelling and trismus. Both protocols (diclofenac sodium with dexamethasone and diclofenac sodium with tramadol) demonstrated adequate analgesic efficacy, but diclofenac sodium + Dexamethasone was more effective in reducing pain intensity,swelling and trismus in the first 24 POH.

V. Conclusion

It can be concluded from the results of this study that preoperative and post operative dose of parentral dexamethasone can be used safely to reduce the degree of facial swelling up to 45% especially on post operative day 3 in surgical removal of wisdom teeth where swelling is greatly expected.

References:-

[1]. Ahlqwist M., Grondahl H-G: Prevelance of impacted teeth and associated pathology in middle aged and older Swedish women. *Community dent oral epidermol*. 1991; 19: 116-119.

[2]. Ong KS, Seymour RA: Maximizing the safety of nonsteroidal antiinflammatory drug use for postoperative dental pain: an evidence-based approach.AnesthProg 50: 62-74, 2003

[3]. Aysegul Mine Tuzuner Oncul et al: Postoperative Analgesia in Impacted Third Molar Surgery: The Role of Preoperative Diclofenac Sodium, Paracetamol and Lornoxicam. Journal of Cranio-Maxillo-Facial Surgery xxx (2012) 1-7.

[4]. Jadson Alípio Santana de Sousa Santos. Comparative study of tramadol combined with dexamethasone and diclofenac sodium in third-molar surgery. Journal of Cranio-Maxillo-Facial Surgery xxx (2012) 1-7.

[5]. Babatunde Olamide Bamgbose et al: Effects of co-administered dexamethasone and diclofenac potassium on pain, swelling and trismus following third molar surgery. J of Head & Face Medicine 2005,1:11

[6]. Kudaravalli jyothsana,Narayan Deshpande and gali.Efficacy and safety of diclofenac sodium and aceclofenac in controlling post extraction dental pain:a randomized open label comparative study.J of Pharmacology and toxicology6(5):541-547,2011

[7]. Zia –ul-haq.use of oral dexamethasone in impacted mandibular third molar surgery. Pakistan oral & dent. Jr. 23 (2) Dec 2003.
Ayaz H., Atta-UR-Rehman,Fahimuddin: Postoperative complication associated with impacted mandibular third molar. Pak Oral and Dent J 2012, 32;389-391

[8]. Bousch J.J. T. and A.V Van Gool: The interrelation of postoperative complaints after removal of the mandibular third molar. Int j. Oral Surg 1977:6;22-28

[9]. Schultze-Mosgau S, Schmelzeisen R, Frolich JC, Schmele H: Use of ibuprofen and methylprednisolone for the prevention of pain and swelling after removal of impacted third molars. J Oral Maxillofac Surg 1995, 53:2-7.

[10]. Huffman G: Use of methylprednisolone succinate to reduce postoperative edema after removal of impacted third molar. J Oral Surg 1977, 35:198-202.

[11]. Tiwana PS, Foy SP, Shugars DA, Marciani RD, Conrad SM, Phillips C, White RP: The impact of intravenous corticosteroid with third molar surgery in patients at high risk for delayed health-related quality of life and clinical recovery. J Oral Maxillofac Surg 2005, 63:55-62.