

Assessment of Post Operative Pain, Swelling and Trismus Following Mandibular Third Molar Extraction after Local Administration of Dexamethasone - A Retrospective Study

Running title: Assessment of Postoperative pain, swelling and trismus after Dexamethasone

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Abstract:

The aim of this study was to assess the post operative pain, swelling and trismus following mandibular third molar extraction after local administration of dexamethasone. This study was conducted among 142 patients who had undergone surgical removal of mandibular third molar reported to a private dental hospital from June 2019 to March 2020 . Data was collected and tabulated in excel. Data was analysed using SPSS version 20 . Results of this study showed that among 142 patients, consisting of 63 females (44.37%) and 79 males (55.63%). There was no statistically significant association between age, gender, tooth number and dexamethasone. Patients experienced less postoperative pain, swelling and trismus after local administration of dexamethasone. We conclude from the present study that the dexamethasone decreases the pain, swelling and trismus following mandibular third molar extraction.

Keywords: Impacted third molar, Pain, Swelling, Trismus , corticosteroids**INTRODUCTION:**

Surgical removal of teeth in oral surgery requires bone removal. Impaction refers to the failure of the tooth to normal occlusal position. Hence, an impacted tooth is considered pathologic and requires treatment (Syed *et al.*, 2013). Since the removal of impacted third molar teeth is a surgical procedure, it carries risk and complications. (Jesudasan, Wahab and Sekhar, 2015) The pain of tooth extraction is likely to be one of the most severe pain that an individual experiences during his or her life (Rao and Kumar, 2018). Major complications associated with postoperative sequelae are pain, swelling and trismus. These factors are associated with impacted teeth, duration of surgery, age of the patients, expertise of the surgeon. Trismus following surgical extraction is secondarily due to pain and swelling (Frost, Hersh and Levin, 2000) According to Starling's law, surgical trauma characterized by hyperemia, vasodilatation is due to increased capillary permeability with an accumulation of fluid in the interstitial space following increased osmotic pressure in capillaries (Messer and Keller, 1975). Analgesics have been the main solution for alleviating pain in the past (Sweta, Abhinav and Ramesh, 2019). To control postoperative inflammation and symptoms associated, it is necessary

to provide adequate anti-inflammatory drugs (Beirne and Hollander, 1986). The swelling and pain are controlled when using anti-inflammatory drugs (Patten, Patten and Hutchins, 1992).

Corticosteroids are known to reduce inflammation, fluid transudation, and edema. Secreted from the adrenal glands, these compounds have a significant role in maintaining metabolism. One of the essential roles played by steroids is their anti-inflammatory role thereby significantly contributing to autoimmune diseases. Their anti-inflammatory role is explained by the principle of endogenous protein synthesis which blocks the enzymatic activation of phospholipase A2. This in turn blocks the release of arachidonic acid from components of cell membrane thereby finally inhibiting substances related to thromboxane such as prostaglandins and leukotrienes (Barron *et al.*, 2004). More specifically, corticosteroids stabilize lysosomal membranes, decrease capillary permeability, suppress accumulation of neutrophils and macrophages at the site of inflammation (Das *et al.*, 2015). This also has a negative role by impairing phagocytosis which is essential for wound healing.

Surgical removal of impacted third molar is considered as a minor surgical procedure done mostly

as on out-patients basis under local anaesthesia. Patients are usually subjected to corticosteroids for not more than 2-3 days at lower doses (Packiri, 2017) .

The aim of this study was to evaluate the post operative pain, swelling and trismus after local administration of dexamethasone.

METHODS AND MATERIALS:

Study Setting:

This present study is conducted as a retrospective cross sectional study with consecutive non probability sampling among the patients visiting a Private Dental Hospital, Chennai, Tamil Nadu. The study setting is a University setting. The present study is ethically approved by the Institutional Ethical Committee (SDC/SIHEC/2020/DIASDATA/0619-0320). The study done in the time period of June 2019 to March 2020. The study sample included both male and female genders but were mostly south Indian population due to geographic limitations.

Data Collection:

The data collected from the patients were demographic data (Age, Sex, Marital Status, Occupation, Address etc.). The total number of patient's case sheets reviewed in the present study was 86000 case sheets. The inclusion criteria for the study was patients who had Pericoronitis or deep caries with pulpitis or for orthodontics reasons and having bilateral mandibular third molar and also case sheets which were completely filled. The exclusion criteria

for the study was patients who had a history of systemic illness (Eg: Syndromes, Diabetes Mellitus, Hypertension) and case sheets which do not have complete details were excluded from the study. Sampling bias was done to minimize by simple random sampling. Any gross data which had the possibility of bias and could affect the studies was not included. All the data collected was cross verified by photographic and radiographic examination.

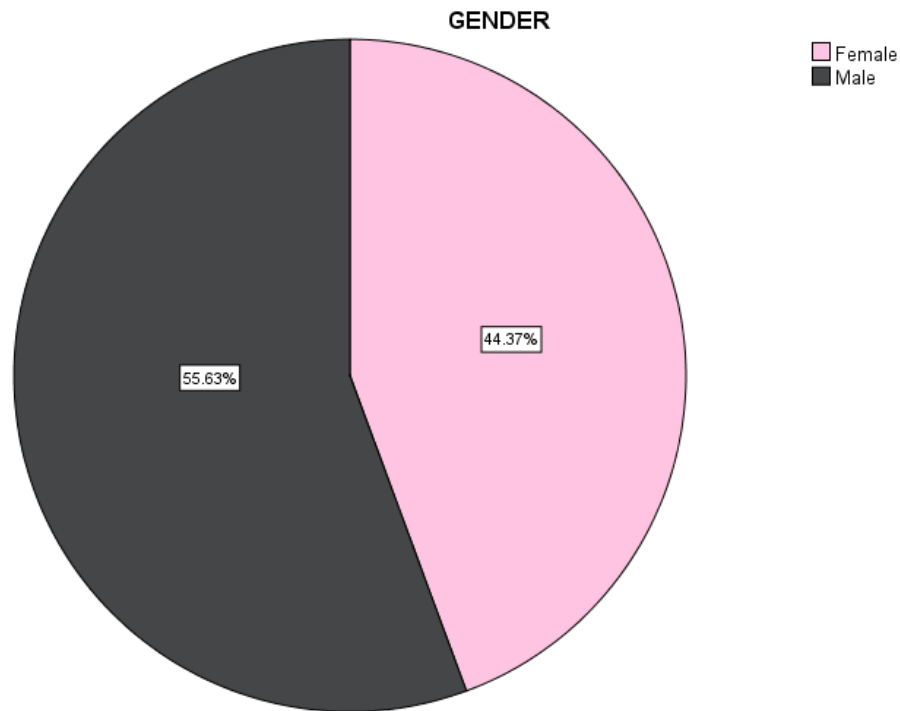
Data Analytics :

Data was entered into a spreadsheet using Excel version 16.37 (Microsoft Corp, Redmond, Wash). The data tabulation in excel was according to S.no, PID, Age, Gender, Tooth number, Pain, Swelling and Trismus. The data which was collected was analyzed using Statistical Package for Social sciences (SPSS) software, version 1.0.0.1347 64 bit (IBM corp., NY, USA). The data was assessed by being subjected to descriptive analysis with the help of frequencies, percentages. Non parametric chi square test was used and results were correlated and associated.

RESULTS AND DISCUSSION:

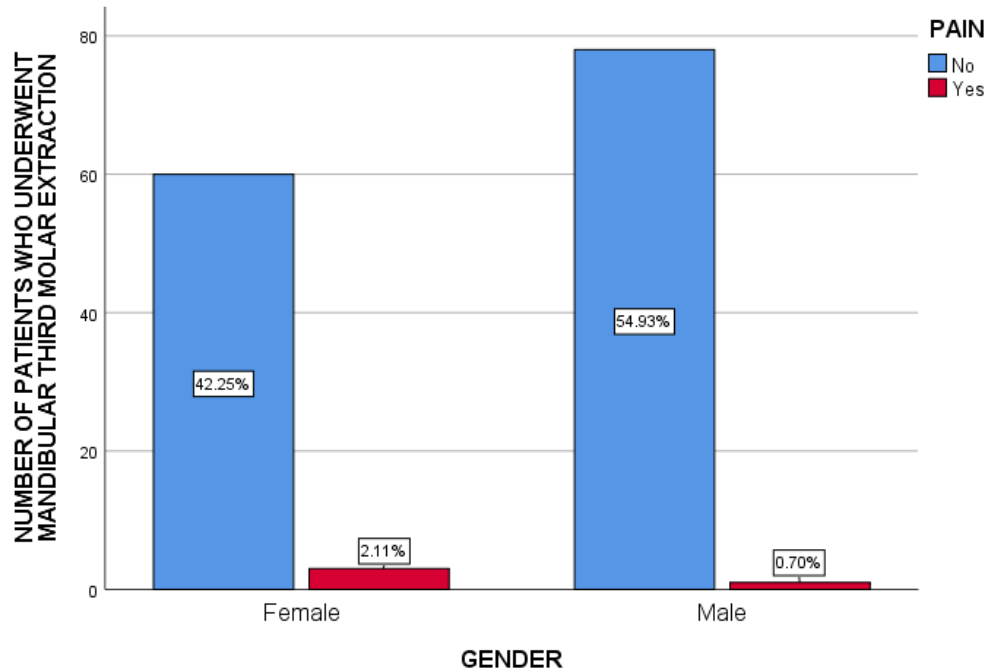
The present study was aimed at evaluating the efficacy of dexamethasone in reducing postoperative pain, swelling, and trismus after removal of the mandibular third molar.

Results of this study showed that among 142 patients, consisting of 63 females (44.37%) and 79 males (55.63%) [Graph 1].



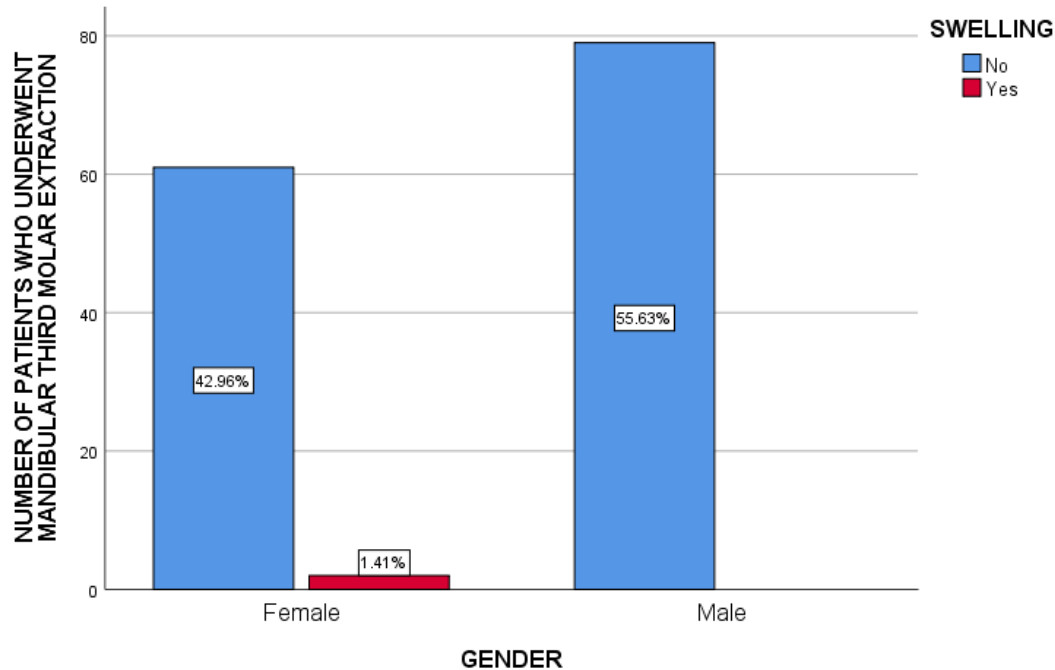
GRAPH 1: Pie chart showing distribution of Gender of the patient. Black color represents the Male patients and Pink color represents the Female patients. Male (44.37%) and Females (55.63%) among the study population.

The Female patients (2.11%) had experienced higher prevalence of postoperative pain compared to male patients (0.70%). Chi square test was performed and association between Gender and Postoperative Pain after Dexamethasone was found to be statistically not significant (P Value = 0.211) [Graph 2].



Graph 2: Bar chart showing association between Gender and Postoperative Pain after Dexamethasone. X axis represents the distribution of patients according to Gender. Y axis represents the number of patients who have undergone mandibular third molar extraction. The Female patients (2.11%) had experienced higher prevalence of postoperative pain compared to male patients (0.70%). Chi square test was performed and association between Gender and Postoperative Pain after Dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.211 ($P > 0.05$), hence statistically not significant.

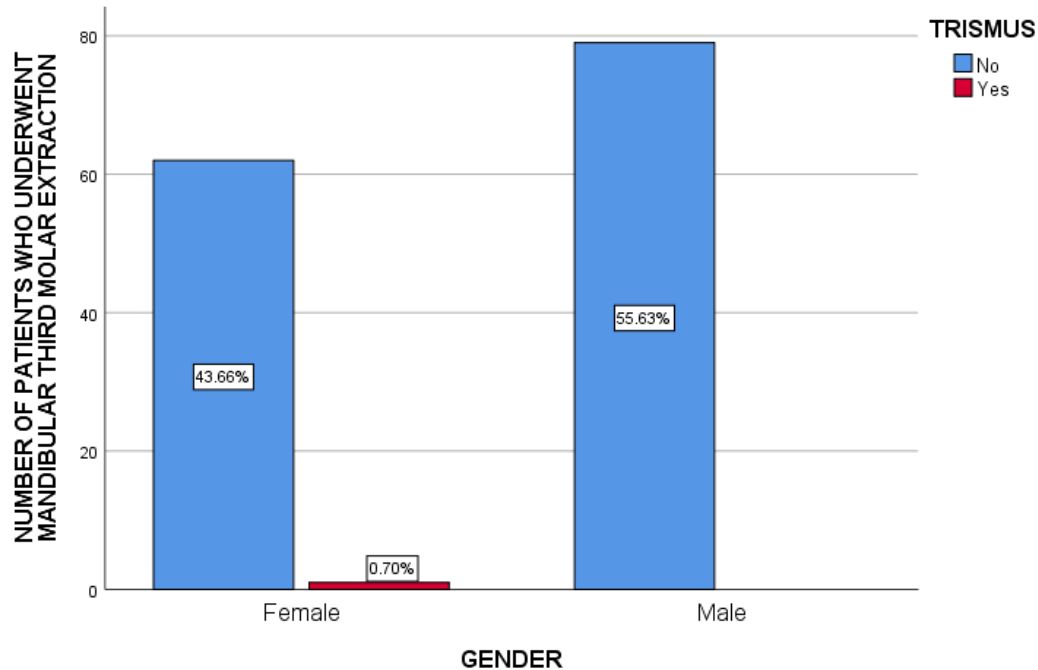
The Female patients (1.41%) had experienced postoperative swelling. Chi square test was performed and association between Gender and Postoperative Swelling after Dexamethasone was found to be statistically not significant (P Value= 0.111) [Graph 3].



Graph 3: Bar chart showing association between Gender and Postoperative Swelling after Dexamethasone. X axis represents the distribution of patients according to Gender. Y axis represents the number of patients who have undergone mandibular third molar extraction. The Female patients (1.41%) had experienced postoperative swelling. Chi square test was performed and association between Gender and Postoperative Swelling after Dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.111 ($P > 0.05$), hence statistically not significant.

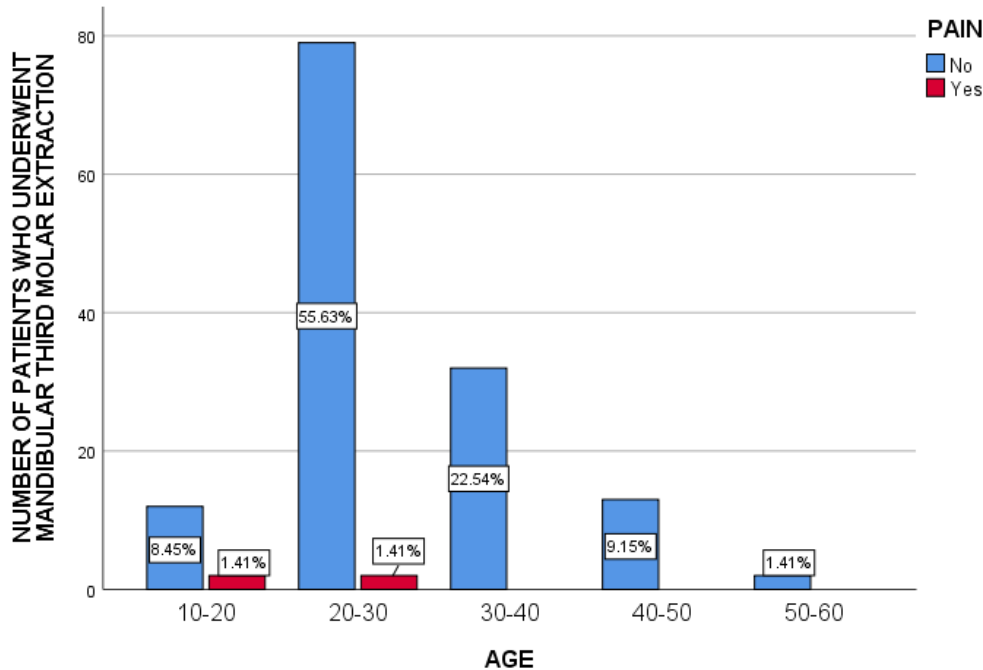
The female patients (0.70%) had experienced higher prevalence of postoperative trismus compared to male patients. Chi square test was performed and

association between Gender and Postoperative trismus after Dexamethasone was found to be statistically not significant (P Value = 0.261) [Graph 4].



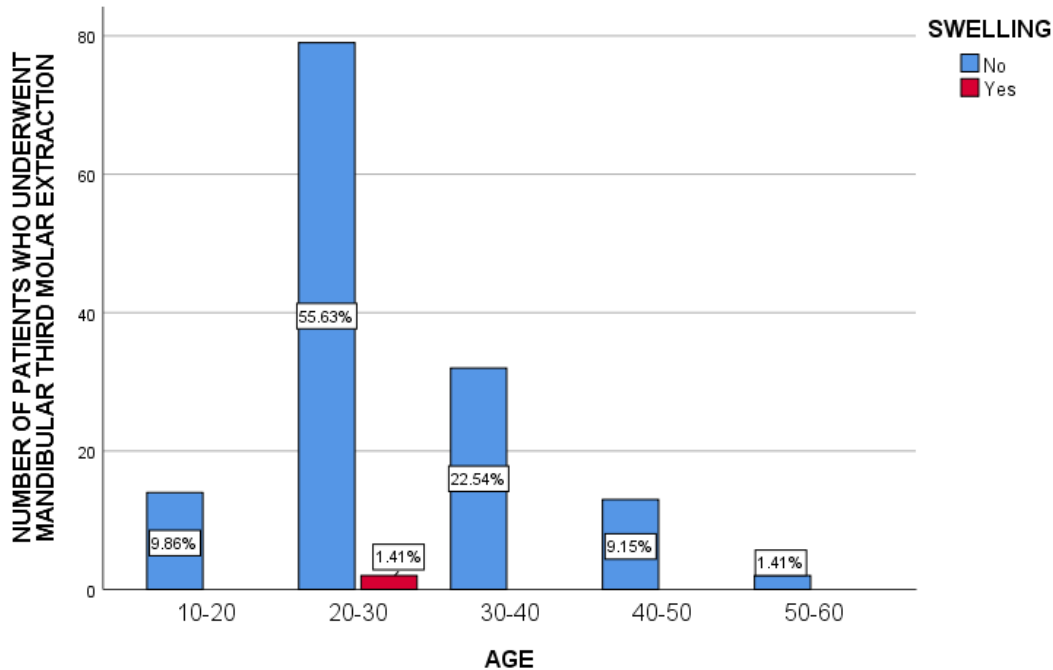
Graph 4: Bar chart showing association between Gender and Postoperative Trismus after Dexamethasone. X axis represents the distribution of patients according to Gender. Y axis represents the number of patients who have undergone mandibular third molar extraction. The female patients (0.70%) had experienced higher prevalence of postoperative trismus compared to male patients. Chi square test was performed and association between Gender and Postoperative trismus after Dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.261 ($P > 0.05$), hence statistically not significant.

The age group of 10-20 and 20-30 years of age (1.41%) had experienced higher prevalence of postoperative pain. Chi square test was performed and association between Age and Postoperative pain after dexamethasone was found to be statistically not significant (P Value = 0.087) [Graph 5].



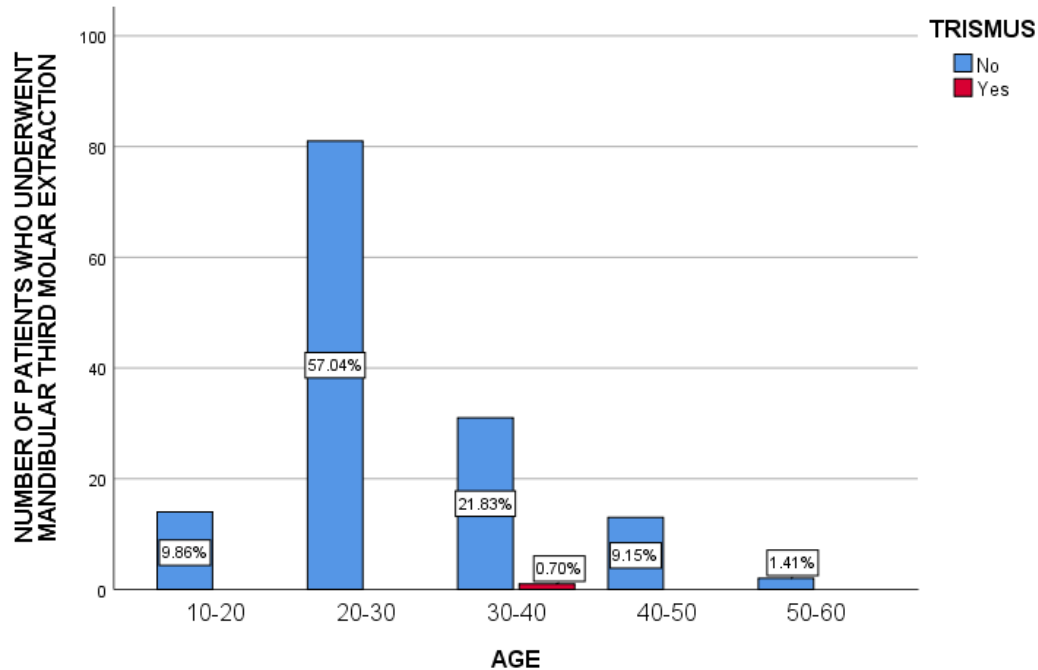
Graph 5: Bar chart showing association between Age and Postoperative pain after Dexamethasone . X axis represents the distribution of patients according to age groups 10-20 years, 20-30 years, 30-40 years, 40-50 years and 50-60 years. Y axis represents the number of patients who have undergone mandibular third molar extraction. The age group of 10-20 and 20-30 years of age (1.41%) had experienced higher prevalence of postoperative pain. Chi square test was performed and association between Age and Postoperative pain after dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.087 ($P > 0.005$), hence statistically not significant.

The age group of 20-30 years of age (1.41%) had experienced higher prevalence of postoperative swelling. Chi square test was performed and association between Age and Postoperative swelling after dexamethasone was found to be statistically not significant (P Value = 0.822) [Graph 6].



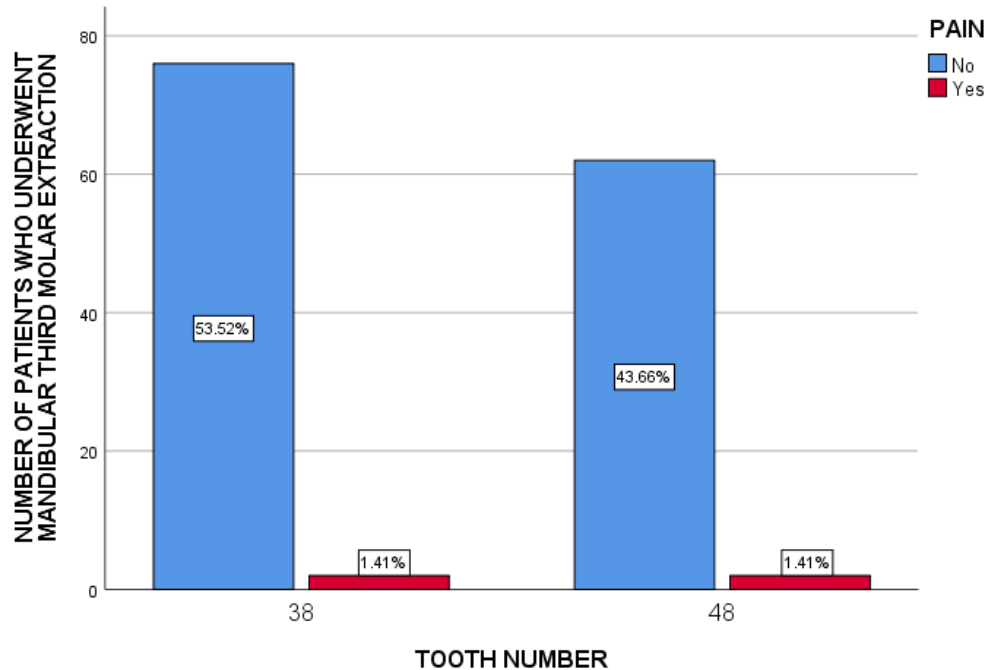
Graph 6: Bar chart showing association between Age and Postoperative swelling after Dexamethasone. X axis represents the distribution of patients according to age groups 15-20 years, 20-30 years, 30-40 years, 40-50 years. Y axis represents the number of patients who have undergone mandibular third molar extraction. The age group of 20-30 years of age (1.41%) had experienced higher prevalence of postoperative swelling. Chi square test was performed and association between Age and Postoperative swelling after dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.822 ($P > 0.005$), hence statistically not significant.

The age group of 30-40 years of age (0.70%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Age and Postoperative trismus after Dexamethasone was found to be statistically not significant (P Value = 0.484) [Graph 7].



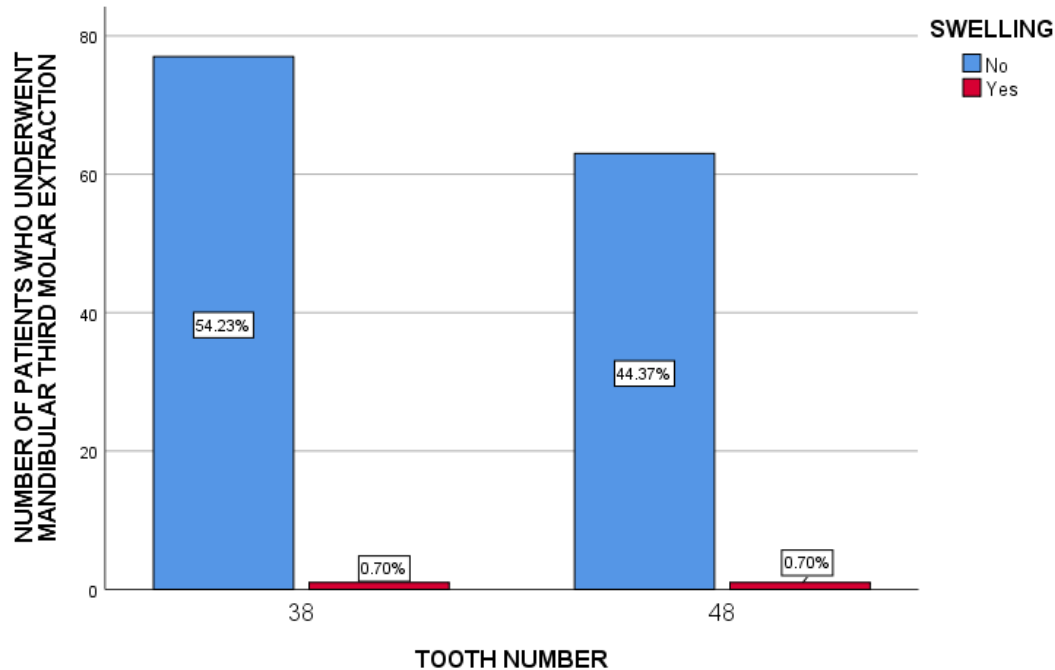
Graph 7: Bar chart showing association between Age and Postoperative Trismus after dexamethasone. X axis represents the distribution of patients according to age groups 15-20 years, 20-30 years, 30-40 years, 40-50 years. Y axis represents the number of patients who have undergone mandibular third molar extraction. The age group of 30-40 years of age (0.70%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Age and Postoperative trismus after Dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.484 ($P > 0.005$), hence statistically not significant.

The Tooth number 38 and 48 (1.41%) had experienced higher prevalence of postoperative pain. Chi square test was performed and association between Tooth number and Postoperative Pain after Dexamethasone was found to be statistically not significant (P Value = 0.841) [Graph 8].



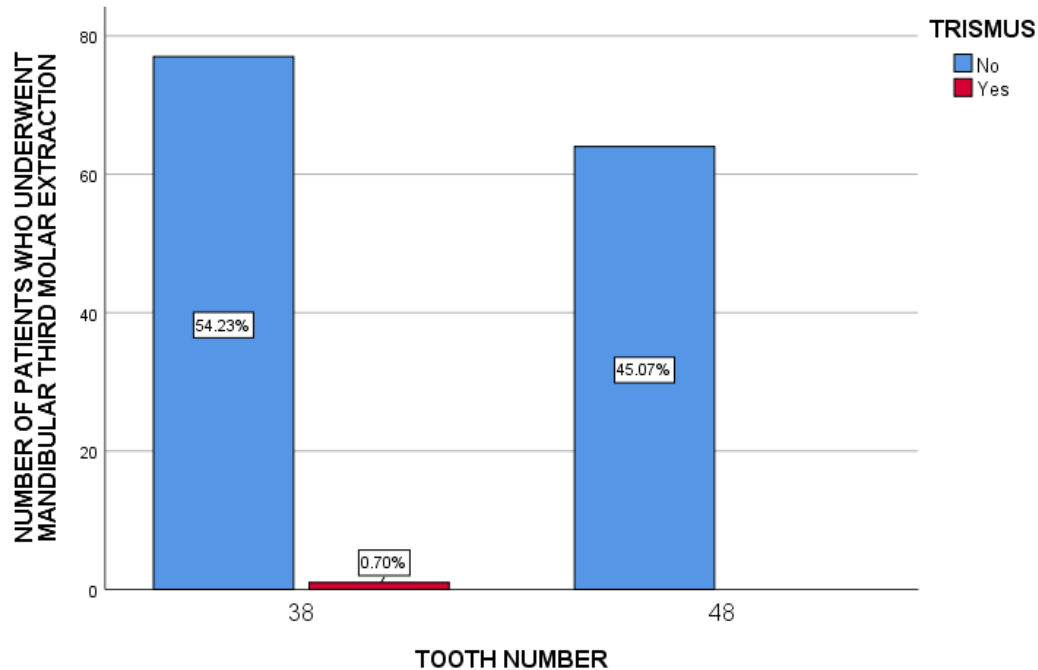
Graph 8: Bar chart showing association between Tooth number and Postoperative Pain after Dexamethasone. X axis represents the distribution of patients according to Tooth number (38,48). Y axis represents the number of patients who have undergone mandibular third molar extraction. The Tooth number 38 and 48 (1.41%) had experienced higher prevalence of postoperative pain. Chi square test was performed and association between Tooth number and Postoperative Pain after Dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.841 (P>0.05), hence statistically not significant.

The Tooth number 38 and 48 (0.70%) had experienced higher prevalence of postoperative swelling. Chi square test was performed and association between Tooth number and Postoperative swelling after Dexamethasone was found to be statistically not significant (P Value = 0.888) [Graph 9].



Graph 9: Bar chart showing association between Tooth number and Postoperative Swelling after Dexamethasone. X axis represents the distribution of patients according to Tooth number (38,48). Y axis represents the number of patients who have undergone mandibular third molar extraction. Both 38 and 48 (0.70%) had experienced equal prevalence of postoperative swelling. Chi square test was performed and association between Tooth number and Postoperative swelling after Dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.888 ($P > 0.05$), hence statistically not significant.

The Tooth number 38 (0.70%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Tooth number and Postoperative Trismus after Dexamethasone was found to be statistically not significant (P Value = 0.363) [Graph 10].



Graph 10: Bar chart showing association between Tooth number and Postoperative Trismus after Dexamethasone. X axis represents the distribution of patients according to Tooth number (38,48). Y axis represents the number of patients who have undergone mandibular third molar extraction. The tooth number 38 (0.70%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Tooth number and Postoperative Trismus after Dexamethasone was found to be statistically not significant. Pearson Chi square Value = 0.363 (P>0.05), hence statistically not significant

Dental extractions are the commonly performed procedures in dental clinics (Santhosh Kumar Mp, 2017). Extraction which is the removal of severely damaged tooth, dentures which are prosthesis in replacing the missing tooth, scaling commonly known as cleaning which is the removal of plaques, periodontal disease which requires gum surgery to treat it, orthodontic braces use to correct the alignment of teeth and jaw (Patturaja and Pradeep, 2016). An ideal tooth extraction is defined as painless removal of the whole tooth or tooth root with minimal trauma to the investing tissues so that the wound heals uneventfully and no postoperative prosthetic problem is created (Rahman and Mp, 2017). The surgical

removal of an impacted third molar tooth can result in considerable pain, swelling and limited mouth opening (Marcotte and Chand, 2016). Swelling usually reaches its maximum within 48-72 hours of the surgical procedure (Packiri, 2017). Minimizing tissue damage can control the amount of post surgical edema. Some studies suggested ice can decrease vascularity and thereby diminishes transduction (Hargreaves *et al.*, 1988). However, no controlled study has verified this practice. The vasoactive amines cause vasodilation, thereby increasing blood flow to the inflamed area (ElHag *et al.*, 1985). The inflammatory process is necessary if healing is to occur but inflammation can also cause edema, pain and trismus (Weber and Griffin, 1994). The intensity of the inflammatory

process may be reduced by administering corticosteroids (Beirne and Hollander, 1986).

Surgical intervention disturbs the normal fascial barriers and tends to accumulate fluid by transudation in the interstitial fluid compartment (Mp and Rahman, 2017). The amount of edema is directly proportional to the extent of tissue injury, duration of surgery, and the percentage of connective tissue in the operative field. Pain is a subjective experience and is influenced by factors such as age, sex, anxiety levels, and also the surgical difficulty (Capuzzi, Montebugnoli and Vaccaro, 1994). Corticosteroids are endocrine secretions from the adrenal glands. They have an effect on almost all the systems of the body, and their secretion is regulated by secretion from the anterior pituitary hormone namely adrenocorticotrophic hormone (ADCH) through a negative HPA axis (Marimuthu *et al.*, 2018). Corticosteroids limit inflammatory mediators and thus lessen fluid transudation and edema (Dionne *et al.*, 2003). Corticosteroids decrease capillary permeability, stabilize lysosomal membranes, and inhibit the release of proteolytic enzymes thereby reducing edema (Kumar and Sneha, 2016). Effect of corticosteroids on reducing swelling, pain, and trismus is vast in the literature. Other than Dexamethasone, Eugenol-based paste and chlorhexidine helps in less postoperative pain, inflammation, infection, and wound healing (Jesudasan, Wahab and Sekhar, 2015), BTX-A was found very effective in the management of various facial pain conditions (S. K. Mp, 2017). When used alone, they are effective in relieving mild to moderate pain such as that seen after maxillofacial, minor orthopaedic or some ambulatory surgical procedures and postpartum pain (Christabel *et al.*, 2016), (Abhinav *et al.*, 2019), (Jain, Muthusekhar and Baig, 2019), (Patil *et al.*, 2017)

Results of this study showed that among 142 patients, consisting of 63 females (44.3%) and 79 males

(55.7%). Based on gender and pain distribution, Only 4 patients in which 3 were females (2.11%) and 1 were males (0.7%) experienced postoperative pain (Graph 1) . These results are similar to study conducted by Antunes et al in their prospective, controlled , randomized trial involving 60 impacted third molars comparatively evaluated pain, trismus and swelling following local administration of dexamethasone (Antunes *et al.*, 2011) . Only 1.4% of patients experienced postoperative swelling after local administration of dexamethasone (Graph 2). These are similar to the study conducted by sabhlok et al. compared the efficacy of dexamethasone in the muscle (Sabhlok *et al.*, 2015). Only 1 participant experienced postoperative trismus (Graph 3). These results are similar to study conducted by Selimovic et al. a non interventional comparative study of oral administration of methylprednisolone with dexamethasone to access trismus following third molar extraction (Selimović *et al.*, 2017).

According to Age wise distribution, the 2nd decade of life experienced postoperative pain, swelling and trismus (Graph 4,5,6). The results are in line with the results in a study conducted by Ngeow and Lim, conducted a review involving 34 articles to assess the efficacy of corticosteroids following third molar surgery (Ngeow and Lim, 2016). According to Tooth number wise distribution (38,48) in which patients who underwent extraction of both 48 and 38 experienced postoperative pain, swelling and trismus compared to 48 (Graph 7,8,9). The results are not in line with the results in a study conducted by Ehsan et al., which is statistically significant (Ehsan *et al.*, 2014).

In our study, there were no significant differences on Pain, swelling and trismus after lower third molar extraction among tooth number, age and gender.

LIMITATIONS:

The main limitation of this study is limited geographic location and confined to limited sample size. This can be corrected by conducting the study in different states, different universities.

CONCLUSION:

We conclude from the present study that the dexamethasone decreases the pain, swelling and trismus following mandibular third molar extraction. The Female patients had experienced higher prevalence of postoperative pain, swelling and trismus compared to male patients. There was no statistically significant association between age, gender, tooth number and dexamethasone. Corticosteroids decrease pain, edema, and swelling by exerting their anti-inflammatory role. This drug might be used more easily and decrease postoperative discomfort, resulting in less harm to patients as a function of the reduction of the numbers of analgesics. The action of dexamethasone was observed different among tooth number, age and gender.

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