Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 11 [4] March 2022 : 191-194

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

Evaluating The Efficacy of Local Anaesthetic Solution With Lignocaine And Adrenaline Concentration Of 1:80000 And 1:200000 In Surgical Removal Of Mandibular Third Molar – A Comparative Study

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ABSTRACT

To compare the clinical efficiency of local anaesthetic solution with different concentration of adrenaline and evaluate the safety measures of local anaesthetic usage with different chemical compositions. This study was conducted on 20 patients requiring surgical removal of tooth. Patients were categorized into 2 groups with 10 samples each. Group I patients were administered 2% lignocaine with 1:80,000 adrenaline and group II patients were administered 2% lignocaine with 1:200,000 adrenaline for the extraction of mandibular molar. Clinical parameters Pain during deposition, onset of action, duration of action, Salivary pH and Blood Pressure are noted before and after administration of local anaesthesia. The mean onset of action in group I was 4.3mins and in group II was 7.5mins, the mean pain during deposition in group I was 9.25 and in group II was 11.75, duration of anesthesia in group I was 261.40 minutes and in group II was 185 minutes, duration of procedure was 30.4 minutes in group I and 32.6 minutes in group II, Blood pressure before procedure in group I was 130/86mmHg and in group II was 126/82mmHg, Blood pressure after procedure in group I was 138/80mmHg and in group II was 128/80mmHg, salivary pH before procedure in group I was 6.38 and in group II was 6.46, Salivary pH after procedure in group I was 6.7 and in group II was 6.78. Lignocaine with 1:80000 adrenaline can be effectively used in oral surgical procedures as there is early onset of action, longer duration of anesthesia, and it causes significant increase in blood pressure compared to Lignocaine with 1:200000 adrenaline.

Keywords: *Adrenaline, Lignocaine, Salivary pH, Blood pressure*

Received 13.12.2021 Revised 14.02.2022 Accepted 24.02.2022

INTRODUCTION

The most common impacted tooth is third molar or wisdom tooth. ultimately it can cause acute pain, infection, tumors, cysts, caries, periodontal disease, and loss of adjacent teeth. Local anesthesia commonly used for removing the third molar. it is a reversible blockade of nerve conduction in a circumscribed area that produces loss of sensation. Lidocaine is the most commonly used local anesthetic agent in dentistry and has excellent efficacy and safety. There are many benefits, addition of a vasoconstrictor to a local anesthetic: improvement in the duration and quality of anesthesia, reduction of blood loss throughout the operation, reduce the peak plasma concentration of the anesthetic agent, and decrease of the minimum concentration of anesthetic necessary for nerve block [1]. Epinephrine is the most studied and widely used vasoconstrictor, which produce its vasoconstrictor effects by binding to and stimulating a1-adrenergic receptors in the walls of arterioles [2]. At low systemic concentrations usually employed in dental anesthesia, epinephrine can increase heart rate (HR) and peripheral vasodilation. Lidocaine concentration affects the efficacy and safety of local anesthesia in patients undergoing surgical extraction

of an impacted mandibular TM [3]. In addition, 2% lidocaine solution used for inferior alveolar nerve block in patients with symptomatic irreversible pulpitis had similar success rates when used with 1:80,000 or 1:200,000 epinephrine concentration [4]. This suggests that the efficacy of 2% lidocaine solution will not be different when it is used with 1:80,000 or 1:200,000 epinephrine concentration. However, the efficacy and safety of 2% lidocaine with 1:80,000 or 1:200,000 epinephrine in surgical extraction of bilateral impacted mandibular TMs has never been compared so far. Hence, we aimed in this study to evaluate the efficacy and safety of 2%lidocaine with 1:80,000 or 1:200,000 epinephrine in surgical extraction of bilateral impacted mandibular TMs.

MATERIAL AND METHODS

This study was conducted on 20 patients requiring surgical removal of tooth.

Inclusion criteria are Adults of either gender (18-40 years), Non – compromised systemic health, Non-Smokers. The exclusion criteria were a history of hypersensitivity to lidocaine or this group of drugs; presence of active infection or abscess at the time of extraction; medical history that might affect the clinical trial; current use of vasoconstrictors, ergot alkaloids, phenothiazines, butyrophenones, tricyclic antidepressants, monoamine oxidase inhibitors, sedatives, or anxiolytics; use of anticoagulants or antiplatelets, within 7 days before the extraction date; use of analgesics within 24hours before the extraction; requirement for sedatives or antianxiolytic drugs during the extraction; pregnancy or breastfeeding; and a history of prior oral or maxillofacial surgery.

Patients were categorized into 2 groups with 10 samples each. Group I patients were administered 2% lignocaine with 1:80,000 adrenaline and group II patients were administered 2% lignocaine with 1:200,000 adrenaline for the extraction of mandibular molar. Clinical parameters such as Pain during deposition, onset of action, duration of action, Salivary pH and Blood Pressure are noted before and after administration of local anaesthesia.

The participants were randomly assigned to receive 2% lidocaine with epinephrine at a concentration of 1:80,000 (the L80 group) or 1:200,000 (the L200 group) at a 1:1 ratio. This study was an double blinded; neither the operator nor the participant was aware of which anesthetic was administered. Each participant is required for equal surgical care on opposite sides of the mandible, which was conducted in 2 visits, 1 to 4 weeks apart.

To minimize the factors which affecting the efficacy and safety evaluation of the trial drugs, all operations, measurements, and postoperative controls were performed by a trained operator. Initially, the participants were administered 0.12% chlorhexidinegluconate. Afterward, the regionalanesthetic blockade of the inferior alveolar nerves and long buccal nerve infiltration with each 1.8mL of the anesthetic solution.

Extraction of the third molar was performed by the buccal approach technique using rotation instruments. At the end operating sites were thoroughly irrigated, suctioned, and sutured then the patients were put on capsule amoxicillin 500 mg thrice a day, tablet metronidazole 400 mg thrice a day and tablet diclofenac potassium 400 mg twice a day for 5 days.

MEASUREMENTS

Duration of surgical procedure, postoperative anesthetic effect and pain were evaluated as follows:

- Onset of anesthesia was estimated by noting the time of injection to the time of patient's first details of numbness. The onset of anesthetic agent effect was verified by both subjective and objective symptoms; by loss of sensitivity of inferior lip, the buccal mucosa, and half of the tongue.
- Pain ratings and efficacy of anesthesia were evaluated instantly after the extraction using the visual analog scale (VAS) where 0 denoted no pain and 10 denoted worst pains.
- Duration of surgery was calculated by after the anesthetic administration the time of onset of anesthesia and patient reporting the loss of numbness on soft tissues (tongue, mucosa, and lip) postoperatively.
- Blood Pressure and Salivary Ph were evaluated using spyghmomanometer and ph meter.

RESULTS

Data were entered in MS excel sheet. The results were assessed with SPSS version 21.0 (SPSS Inc., Chicago, IL, USA). Chi-square test and independent t test were used for this study. The p value was considered as a significant at less than 0.05.

Table 1 shows the type of anesthesia and number of patients used in this study. Each group had 10 patients.

Table 2 shows that mean onset of action in group I was 4.7minutes and in group II was 7.5minutes, duration of anesthesia in group I was 261 minutes and 185 minutes in group II . Duration of surgical procedure was 30.4 minutes in group I and 32.6 minutes in group II, pain during procedure in group I was 2.75 and in group II was 1.42, pain after procedure was 1.41 in group I and 0.82 in group II, pain during anesthesia insertion was 2.9 in group I and 3,3 in group II. Independent t test showed there is a significant

difference in both groups ($p < 0.05$) except duration of procedure and pain during anesthesia insertion ($p > 0.05$). Blood pressure before procedure in group I was 130/86mmHg and in group II was 126/82mmHg, Blood pressure after procedure in group I was 138/80mmHg and in group II was 128/80mmHg, salivary pH before procedure in group I was 6.38 and in group II was 6.46, Salivary pH after procedure in group I was 6.7 and in group II was 6.78.

Table 1: Distribution of patients

S.NO	GROUP I	GROUP II
1	2% lignocaine with 1:80,000 epinephrine	2% lignocaine with 1:2,00,000 epinephrine
2	10	10

Table 2: Comparison of clinical parameters in both groups

S.NO	PARAMETER		GROUP I	GROUP II	P VALUE
1	Pain during procedure		2.75	1.45	0.02
2	Pain after procedure		1.41	0.82	0.01
3	Onset of action (mins)		4.7	7.5	0.08
4	Duration of action (mins)		261	185	0.02
5	Duration of Procedure (mins)		30.4	32.6	0,05
6	BP	Before	130/86mmHg	126/82mmHg	0.034
		AFTER	138/80mmHg	128/80mmHg	0.102
7	pH	BEFORE	6.38	6.46	0.03
		AFTER	6.7	6.78.	0.04

DISCUSSION

The efficacy of any anesthetic solution is can be judged by its ability to relieve pain, frequent onset on action, and longer duration of anesthesia effect. Lignocaine, commonly known as "Lidocaine", it is a short-acting amide local anesthetic agent[5]. World Health Organization (WHO) has included this solution in essential drug list. which reveals its effects by blocking nerve fiber impulse. Lignocaine causes depolarization by binding to the sodium channels, hence preventing the transient influx of sodium. In lignocaine the onset of action is rapid and it blocks the sensory fibers which are unmyelinated, thinner, and more easily penetrated [6]. The efficacy and complications are differ, which is depending on the concentration of epinephrine added to the lidocaine. The efficacy and safety of 2% lidocaine with 1:80,000 or 1:200,000 epinephrine for treatment of the impacted third molar have not previously been conducted. In This study comparatively evaluated the efficacy and safety of 2% lidocaine with 1:80,000 or 1:200,000 epinephrine in surgical extraction of bilateral impacted mandibular TMs. Although there was a difference in VAS pain scores between the 2 groups after the operation, it was not statistically significant (P>.05) and there was a difference between the groups in the time of onset of pain after the operation, but it was also not statistically significant (P=.246). Changes in systolic BP and HR after the administration of the anesthetic solution were significantly greater in the L80 group than in the L200 group (P>.01). There were no severe adverse event results from the anesthetics.

In dentistry, epinephrine is the most commonly used vasoconstrictor for local anesthesia to provide excellent anesthetic effect and bleeding control [7]. Epinephrine is an effective vasoconstrictor and also generally safe, it has many adverse effects depending on the dosage, such as hypertension, tachycardia, arrhythmia, and circulatory failure, especially in patients with cardiovascular diseases.

CONCLUSION

Lignocaine with 1:80000 adrenaline has early onset of action; longer duration of anesthesia and it also causes significant increase in blood pressure compared to Lignocaine with 1:200000 adrenaline. In this study, there were no differences between the 2 groups in adverse events after administration of the anesthetics. Hence, epinephrine at 1:200,000 concentration is presumed to be equally effective as the 1:80,000 concentration and safer than the 1:80,000 concentration for patients with hemodynamically unstable patients.

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CITATION OF THIS ARTICLE

Veeramuthu M., Karthikeyan M., Balagugan B., Karthikeyan G. R., Deepak V., Mathan Mohan A. Evaluating The Efficacy Of Local Anaesthetic Solution With Lignocaine And Adrenaline Concentration Of 1:80000 And 1:200000 In Surgical Removal Of Mandibular Third Molar – A Comparative Study.Bull. Env. Pharmacol. Life Sci., Vol 11[4] March 2022 : 191-194.