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# **Original Research**

## Comparison of two different local anesthetic solutions among patients undergoing dental extraction

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#### ABSTRACT:

**Background:** To compare and analyse two different local anesthetic solutions undergoing dental extraction. **Materials & methods:** A total of 50 subjects were enrolled. The subjects were in the age group 20-50 years. The patients were divided into 2 groups and comprised of 25 subjects in each group. Group 1- 2% lignocaine with 1: 80000 and group 2: adrenaline concentration with 1:200000. **Results:** There was no significant change in both the groups in the point of view of time of onset. With regard to the duration of action of LA, 1:80000 adrenaline concentrations showed more than that of 1:200000. This is due to the faster absorption of LA when used with less concentration of adrenaline. The amount of LA used for both the groups does not show any significant change. **Conclusion:** The use 2% lignocaine with 1:200000 for cardiac patients is recommended.

Keywords: lignocaine, extraction, adrenaline.

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#### **INTRODUCTION**

Local anesthetic agents are chemicals that reversibly block the transmission of action potential of nerve membrane.<sup>1</sup> An essential pre-requisite to success in dentistry is to achieve good quality local anesthesia (LA). Local anesthetic agents are normally associated with absence of pain during surgical intervention in bone and soft tissue. There are many local anesthetic agents, lignocaine being the gold standard available with the wide selection of vaso-constrictive agents that improve the clinical efficacy and the duration LA.<sup>2</sup>

Pain is a nearly ubiquitous phenomenon—a fact of everyday life. Pain is the chief symptom that brings patients to dental or medical attention. Local anesthetics are frequently used by the dental surgeon to control intra-operative pain. An oral surgeon has to use local anesthetics for most minor surgical procedures. Increase in stress, decrease in physical activity, irregular food habits, consumption of nutritionally poor food have a detrimental effect on a person's health. All these factors and many more have increased the incidence of juvenile and maturity onset diabetes on one hand and the use of hypoglycemics on the other.<sup>3</sup> Since lignocaine with or without adrenaline is one of the most commonly used local anesthetics in our country, we decided to undertake a study to observe its effects on blood glucose concentration in patients undergoing tooth extraction. Most dental treatments are performed under local anesthesia, and an increase in blood pressure is common even in normotensive patients. This increase is influenced by many factors, such as psychological and physical stress, painful stimuli and the action of catecholamine present in local anesthetic. <sup>4</sup>Adrenaline prolongs the duration as well as the depth of anesthesia. It is effective in preventing or minimizing blood loss during surgical procedures. Due to vaso-constrictive effects of adrenaline, absorption of LA and systemic toxicity are reduced. If adrenaline is not added to lignocaine, vasodilating effect of lignocaine limits pulpal anesthesia to only 5-10 min. 0.2 mg Adrenaline is a safe maximum dose in healthy patients and it is best to limit the total dose to 0.04 mg in cardiac patients. It should be kept to a minimum amount capable of producing adequate results. Adrenaline acts directly on both  $\alpha$  and  $\beta$ -adrenergic receptors. Systemically adrenaline like drugs can cause a number of cardiovascular disturbances while most are short lived, permanent injury or even death may drug induced ventricular fibrillation, follow myocardial infarction or cerebro-vascular accidents.<sup>5</sup>

Hence, this study was conducted to compare and analyse two different local anesthetic solutions undergoing dental extraction.

#### **MATERIALS & METHODS**

A total of 50 subjects were enrolled. The subjects were in the age group 20-50 years. They underwent extractions of mandibular bilateral teeth using 2% lignocaine with two different concentrations - one with 1:80000 and the other with 1:200000. The patients were divided into 2 groups and comprised of 25 subjects in each group. Group 1- 2% lignocaine with 1: 80000 and group 2: adrenaline concentration with 1:200000. The data was collected and results were analysed using SPSS software.

#### RESULTS

A total of 50 subjects were enrolled. There was no significant change in both the groups in the point of view of time of onset. With regard to the duration of action of LA, 1:80000 adrenaline concentrations showed more than that of 1:200000. This is due to the faster absorption of LA when used with less concentration of adrenaline. The amount of LA used for both the groups does not show any significant change.

Table 1: Time of onset, duration, amount of LAused and pain (VAS) comparison in two groups.

	Group	Ν	Mean
Time of onset (subjective)	1	25	1.70
	2	25	1.58
Time of onset (objective)	1	25	3.10
	2	25	3.28
Duration	1	25	148.66
	2	25	114.36
La amount	1	25	148.66
	2	25	114.36
VAS	1	25	1.08
	2	25	1.19

LA: local anesthesia, VAS: visual analogue scale There was significant rise in the pulse rate immediately when LA with 1:80000 adrenaline concentrations was used and it came to the normal gradually after 60 min. But when LA with 1:200000 adrenaline concentrations was used, there was no significant rise in the pulse rate.

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Table 2	: Variations	in pulse rate

Time	Mean value pulse rate		
	Group 1	Group 2	
Initial	73.05	75.66	
Immediate	83.33	76.02	
10 minute	82.01	75.32	
60 minute	76.85	75.64	

#### DISCUSSION

The presence of a vasoconstrictor in the anesthetic cartridge has a major influence on the duration of anesthesia.<sup>6</sup> The ability of vasoconstrictors to retard the systemic absorption of injected LA agents is the basis for their widespread use.<sup>5</sup> Vasoconstrictors

employed in local anesthetic solutions have the potential for interacting with the wide variety of drugs.<sup>7</sup> Physiological responses associated with local anesthetic solutions containing a vasoconstrictor have included changes in heart rate and BP, dysarrythmias, ischemic changes (ST segment and T wave), the release of endogenous catecholamines, endocrine response to surgery and hypokalemia. 8 Local aesthetic agents with adrenaline as the vasoconstrictor used for the surgical soft tissue and bone interventions in the oral region tend to cause more post-operative without adrenaline as the pain than LA vasoconstrictor.9 Hence, this study was conducted to compare and analyse two different local anesthetic solutions undergoing dental extraction.

In the present study, a total of 50 subjects were enrolled. There was no significant change in both the groups in the point of view of time of onset. With regard to the duration of action of LA, 1:80000 adrenaline concentrations showed more than that of 1:200000. This is due to the faster absorption of LA when used with less concentration of adrenaline. The amount of LA used for both the groups does not show any significant change. A study by Managutti A et al, studied that local anesthetic agents are more commonly used in dentistry to have painless procedure during surgical intervention in bone and soft tissue. Systemically adrenaline like drugs can cause a number of cardiovascular disturbances while most are short lived, permanent injury or even death may follow in drug induced ventricular fibrillation, myocardial infarction or cerebro-vascular accidents. They compared the efficacy and cardiovascular effects with the use of 2% lignocaine with two different concentrations. Forty patients underwent extractions of mandibular bilateral teeth using 2% lignocaine with two different concentrations - one with 1:80000 and the other with 1:200000. There was no significant difference in the efficacy and duration with the 2% lignocaine with 2 different 2% lignocaine with concentrations. 1:80000 adrenaline concentration has significantly increased the heart rate and blood pressure especially systolic compared with the lignocaine with 1:200000.10

In the present study, there was significant rise in the pulse rate immediately when LA with 1:80000 adrenaline concentrations was used and it came to the normal gradually after 60 min. But when LA with 1:200000 adrenaline concentrations was used, there was no significant rise in the pulse rate. Another study by Kalra P et al, studied the comparative evaluation of local anesthesia with adrenaline and without adrenaline on blood glucose concentration in patients undergoing tooth extraction. They included 120 patients comprising of 60 healthy and 60 diabetic patients. All these patients were in need of multiple extractions. The patients were in the age group of 18-50 years. On their first visit the patients were given plain lignocaine and tooth extraction was carried out. One week later the same patient was given lignocaine with 1:80,000 adrenaline to carry out tooth extraction. Serial blood glucose estimations were done at definite intervals (prior to administration of local anesthetic, immediately after injecting the LA, 10 and 20 min following the injection of LA) on both the occasions. The mean blood glucose concentration increased from the base line level of 84.81 to 85.09 mg/dl in healthy patients and from 206.82 to 207.09 mg/dl in diabetic patients 10 min following the injection of 2% plain This increase in blood glucose lignocaine. concentration following the administration of plain lignocaine was statistically not significant (P > 0.05). There was statistically significant (P < 0.005) increase in the blood glucose concentration from 88.81 to 105.55 mg/dl in healthy, and 208.77 to 242.46 mg/dl in diabetic patients 20 min following the injection of lignocaine with adrenaline.<sup>11</sup>Vasoconstrictors are used in local anesthetic solutions to retard their systemic absorption. This enhances the local anesthetic effect by localizing it to the site of injection, decreases toxicity by retarding systemic absorption, prolongs the duration of anesthesia, and may decrease the total dose of the local anesthetic drug required.12 Another secondary advantage to the use of vasoconstrictors in local anesthetic solutions is in the control of bleeding haemostatic effect that the vasoconstrictor or provides. <sup>12</sup>Meechan JG recorded the rise in blood glucose following the injection of 30 ml of local anesthetic solution containing 1:200,000 adrenaline as crural blocks. 13

#### CONCLUSION

The use 2% lignocaine with 1:200000 for cardiac patients is recommended.

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