

## Original ARTICLE

### Evaluation and comparison of the effectiveness of plain lignocaine and lignocaine with adrenaline on socket healing post extraction

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#### ABSTRACT

**Background:** The most reliable means of providing painless surgery is the effective administration of local anesthesia (LA), and profound infiltration of the local anesthetic agent is an essential fundamental factor for successful periodontal procedures. Hence; the present study was undertaken for comparing the effectiveness of plain lignocaine and lignocaine with adrenaline on socket healing post extraction. **Material and method:** 180 patients were included in this study who was supposed to undergo orthodontic extraction of premolar teeth. Demographic details of the patients were recorded and informed consent was taken. One side was assigned for lignocaine without adrenaline (study group) and the contralateral side for lignocaine with adrenaline (control group). Wound Healing was assessed on the 1st, 3rd and 7th post-operative days using modified Landry's Wound Healing Index. All patients were reviewed for any postoperative complications during wound healing. **Results:** 81 out of 180 patients were males. 137 out of 180 patients were below 16 years of age. On the 1st post-operative day, it was observed that the mean modified Landry's Wound Healing score of the study group and the control group was  $4.58 \pm 0.481$  and  $3.23 \pm 0.583$  respectively. On the 3rd post-operative day, score was  $4.74 \pm 0.466$  and  $3.31 \pm 0.629$  respectively. However, on the 7th post-operative day, the score was  $4.89 \pm 0.203$  and  $4.86 \pm 0.241$  respectively. A statistically significant difference was observed between the two groups on the first and the third day post extraction but not on the 7<sup>th</sup> day follow up. **Conclusion:** Plain lignocaine results in better wound healing in the initial post operative period as compared to lignocaine with adrenaline.

**Key words:** Lignocaine, Adrenaline

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#### INTRODUCTION

The fear of dentistry or dental procedures is a commonly observed emotion which is attributed to pain; especially with tooth extraction procedures which require administration of local anaesthetic (LA) injections<sup>1-2</sup>. Since lignocaine with or without adrenaline is one of the most commonly used local anaesthetics 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 anaesthesia, 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 anaesthetic<sup>3</sup>.

Lidocaine is usually used with epinephrine in a single cartridge. Epinephrine is added to lidocaine to reduce toxicity, prolong duration of anesthesia and control bleeding. It is available in a synthetic form and can be harvested from the central part of the adrenal gland. An LA cartridge usually contains 1.8 mL of lidocaine with 1/200,000, 1/1,000,000 and 1/80,000 concentrations of epinephrine (10 µg, 20 µg and 25 µg of epinephrine, respectively)<sup>4</sup>.

However, the use of adrenaline is contraindicated in situations like cardiovascular diseases<sup>5</sup> and uncontrolled hyperthyroidism<sup>6</sup>. In addition, it is sometimes associated with unfavourable allergic

reaction due to Sodium metabisulphite, which is added to LA solutions to prevent oxidation of adrenaline<sup>7</sup>. Hence, this study was undertaken to evaluate and compare the effectiveness of plain lignocaine and lignocaine with adrenaline on socket healing post extraction.

## MATERIAL AND METHOD

The purpose of the present study was to evaluate and compare the effectiveness of plain lignocaine and lignocaine with adrenaline on socket healing post extraction. A total of 180 patients were included in this study who were supposed to undergo orthodontic extraction of premolar teeth. Demographic details of the patients were recorded and informed consent was taken. The patients were made comfortable in the dental chair and were kept unaware of the anesthetic solution used on either side. The study was done using the 'split-mouth method', where one side was assigned for lignocaine without adrenaline (study group) and the contralateral side for lignocaine with adrenaline (control group). Thus, each patient was his/her own control, to eliminate inter-patient bias.

Volume of LA solution injected was 0.5–0.9 ml for suprapariosteal and incisive nerve block, 0.3–0.4 ml for palatal infiltration and 0.5–0.6 ml for lingual nerve infiltration. Approximately 5 minutes after the delivery of local anesthesia subjective symptoms of anesthesia were evaluated and the VAS (visual analog scale) was explained to the patients in detail before carrying out the extraction procedure. Wound Healing was assessed on the 1st, 3rd and 7th post-operative days using modified Landry's Wound Healing Index<sup>8</sup>. All patients were reviewed for any postoperative complications during wound healing.

### Modified Landry's wound healing score

Healing score	Characteristics
1- Very poor	Tissue colour: $\geq 50\%$ of gingiva red Response to palpation: bleeding Granulation tissue: present Suppuration present Presence of Alveolar osteitis
2- Poor	Tissue colour: $\geq 50\%$ of gingiva red Response to palpation: bleeding Granulation tissue: present
3- Good	Tissue colour: $\geq 25\%$ and $\leq 50\%$ of gingiva red Response to palpation: no bleeding Granulation tissue: none
4- Very good	Tissue colour: $< 25\%$ and $\leq 50\%$ of gingiva red Response to palpation: no bleeding Granulation tissue: none
5- Excellent	Tissue colour: all tissues pink Response to palpation: no bleeding Granulation tissue: none

Entire data was recorded in the Microsoft excel sheets. SPSS software was used for statistical analysis. Chi square test and student T test were used to compare the variables. P-value of less than 0.05 was considered significant

## RESULTS

The purpose of the present study was to evaluate and compare the effectiveness of plain lignocaine and lignocaine with adrenaline on socket healing post extraction. In the current study 81 out of 180 patients were males comprising of 45% of the study sample. Females accounted for 55% of the sample size (table 1).

**Table 1:** Gender-wise distribution of patients

Gender	Number of patients	Percentage of patients
Male	81	45
Female	99	55
Total	180	100

Majority of patients scheduled to undergo premolar extraction in this study were below 16 years of age. 137 out of 180 patients were below 16 years of age accounting for 76.11% of the sample size. Only 43 out of 180 patients were above 16 years of age accounting for 23.88% of the study group (table 2).

**Table 2:** Distribution of patients according to age

Age group (years)	Number of patients	Percentage of patients
< 16 years	137	76.11
$\geq 16$ years	43	23.88
Total	180	100

On the 1st post-operative day, it was observed that the mean modified Landry's Wound Healing score of the study group and the control group was  $4.58 \pm 0.481$  and  $3.23 \pm 0.583$  respectively. Thus, a statistically significant difference was observed between the two groups, with the P-value being 0.001. On the 3rd post-operative day, it was observed that the mean modified Landry's Wound Healing score of the study group and the control group was  $4.74 \pm 0.466$  and  $3.31 \pm 0.629$  respectively. Thus, a statistically significant difference was observed between the two groups, with the P-value being 0.002. However, on the 7th post-operative day, it was observed that the mean modified Landry's Wound Healing score of the study group and the control group was  $4.89 \pm 0.203$  and  $4.86 \pm 0.241$  respectively. Statistically significant difference was not observed between the two groups, with the P-value being 0.56 (table 3).

Variable	Study group	Control group	P-value
Wound healing on day 1 Mean $\pm$ SD	$4.58 \pm 0.481$	$3.23 \pm 0.583$	0.001
Wound healing on day 3 Mean $\pm$ SD	$4.74 \pm 0.466$	$3.31 \pm 0.629$	0.002
Wound healing on day 7 Mean $\pm$ SD	$4.89 \pm 0.203$	$4.86 \pm 0.241$	0.56

## DISCUSSION

The most reliable means of providing painless surgery is the effective administration of local anesthesia (LA), and profound infiltration of the local anesthetic agent is an essential fundamental factor for successful periodontal procedures<sup>9</sup>. Injection of Lignocaine with adrenaline is the most commonly used solution for achieving anaesthesia. Adrenaline is generally added to LA solution to achieve a bloodless surgical field, increase the duration of action of LA and reduce the systemic absorption of LA solution by the vasoconstrictive action of adrenaline<sup>10</sup>.

The use of local anesthetic agents with vasoconstrictors in cardiac patients has been a matter of much debate. In 1964, a conclusion was drawn by the workshop-conference of the American Dental Association and the American Heart Association that

vasoconstrictors were allowed for usage in LA without contraindications in patients with cardiovascular disease if administered cautiously and with prior aspiration<sup>11</sup>.

The purpose of the present study was to evaluate and compare the effectiveness of plain lignocaine and lignocaine with adrenaline on socket healing post extraction. In the current study 81 out of 180 patients were males comprising of 45% of the study sample. Females accounted for 55% of the sample size (table 1). Puneet Kalra et al conducted a study to do the comparative evaluation of local anaesthesia with adrenaline and without adrenaline on blood glucose concentration in patients undergoing tooth extraction. he study was conducted on 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 anaesthetic, 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 lignocaine. This increase in blood glucose 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. While assessing the generalized effects of local anaesthetic solutions, metabolic as well as haemodynamic responses should be investigated. Adrenaline containing LA should be used with caution in Type 2 diabetics as adrenaline causes suppression of insulin release<sup>12</sup>.

Majority of patients scheduled to undergo premolar extraction in this study were below 16 years of age. 137 out of 180 patients were below 16 years of age accounting for 76.11% of the sample size. Only 43 out of 180 patients were above 16 years of age accounting for 23.88% of the study group (table 2). Elavetil Panneerselvam et al evaluated the efficacy of two local anaesthetic solutions, 'Plain lignocaine' and 'Lignocaine with vasoconstrictor', on pain during administration and post-extraction wound healing in patients undergoing therapeutic extractions. Fifty patients indicated for therapeutic extraction of upper and lower premolars for orthodontic purpose were recruited for the study. Using a split-mouth study design, anaesthesia was achieved using lignocaine with adrenaline on the control side and plain lignocaine on the study side. Pain perception was measured by modified visual analogue scale and wound healing was assessed by Landry's Wound Healing Index. Sample allocation was done by simple randomization. The outcome parameters compared were (1) pain during administration of LA and (2) post-operative healing after extraction. Data analysis involved Chi-square test to compare proportions between treatment groups and independent sample t-test to compare mean values between treatment groups. SPSS version 22.0 was used to analyse the data. The study group demonstrated a statistically significant wound healing on day1 and day 3 between the study and control group with  $p < 0.001$ . In the control group 68% had severe pain, whereas only 2% had severe pain in the study group. The proportions between the two groups were statistically significant ( $p < 0.001$ ). The patients who

received Plain Lignocaine perceived less pain during injection of local anaesthetic solution when compared to patients who received lignocaine with vasoconstrictor. The early post-operative wound healing was better in patients anaesthetized by Plain Lignocaine<sup>8</sup>.

On the 1st post-operative day, it was observed that the mean modified Landry's Wound Healing score of the study group and the control group was  $4.58 \pm 0.481$  and  $3.23 \pm 0.583$  respectively. . Thus, a statistically significant difference was observed between the two groups, with the P-value being 0.001. On the 3rd post-operative day, it was observed that the mean modified Landry's Wound Healing score of the study group and the control group was  $4.74 \pm 0.466$  and  $3.31 \pm 0.629$  respectively. . Thus, a statistically significant difference was observed between the two groups, with the P-value being 0.002. However, on the 7th post-operative day, it was observed that the mean modified Landry's Wound Healing score of the study group and the control group was  $4.89 \pm 0.203$  and  $4.86 \pm 0.241$  respectively. . Statistically significant difference was not observed between the two groups, with the P-value being 0.56 (table 3). Mohammad Ketabi et al evaluated Influence of local anesthetics with or without epinephrine 1/80000 on blood pressure and heart rate. The study was a randomized double-blind experimental clinical trial. Forty subjects were divided into two equal groups and two subgroups. In one group, INF and in the other group, IANB were used and, further, in one subgroup lidocaine and in another subgroup, lidocaine plus epinephrine were used. BP and HR were recorded before and 10 min after. The paired t-test for intragroup differences and independent t-test for intergroup analysis were used at the significant level of  $P \leq 0.05$ . The mean BP and HR values were reduced after injection of lidocaine in both INF and IANB compared with baseline. The differences were statistically significant ( $P < 0.05$ ), but, on comparing these values between the two injection methods, the differences were not statically significant ( $P = 0.089$  and  $0.066$ , respectively). The mean BP and HR values were increased after injection of lidocaine plus epinephrine in both INF and IANB compared with baseline, and these were statistically significant ( $P < 0.05$ ) but, on comparing these values between the two methods, the differences were not statically significant ( $P = 0.071$  and  $0.092$ , respectively). The rise in BP and HR following injection of lidocaine plus epinephrine was statistically significant compared with baseline in both INF and IANB, but this was not clinically and numerically considerable<sup>13</sup>.

## CONCLUSION

From the above study the author concluded that plain lignocaine results in better wound healing in the initial post operative period as compared to lignocaine with adrenaline. Further studies are recommended.

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