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# Original Research

## Comparative evaluation of bupivacaine and lignocaine in single sitting root canal treatment

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***ABSTRACT***
**Background:** The present study was conducted with the aim to compare bupivacaine and lignocaine in single sitting root canal treatment. **Materials & Methods:** The present study was conducted on 50 patients. Patients were randomly divided into 2 groups. In group I, 2% lignocaine was administered and in group II, 0.5% bupivacaine was administered. The visual analogue scale was recorded (VAS) before treatment and 4, 8, 16 and 36 hours after root canal treatment. **Results:** Mean VAS before treatment in both group I was 6, at 8 hours was 4.5 in group I and 4.3 in group II, at 8 hours was 5.2 in group I and 5.0 in group II, at 16 hours was 3.2 in group I and 2.5 in group II and at 36 hours was 2.5 in group I and 1.2 in group II. The difference was significant ($P< 0.05$). **Conclusion:** Authors suggested that both bupivacaine and lignocaine could be used in single sitting root canal treatment. However, 0.5% bupivacaine provided better results as compared to 2% lignocaine.
**Key words:** lignocaine, Local anesthesia, Pain

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## INTRODUCTION

Local anesthesia is the temporary loss of sensation or pain in one part of the body produced by a topically applied or injected agent without depressing the level of consciousness. Dental anesthetics fall into two groups: Esters (procaine, benzocaine) and amides (lidocaine, mepivacaine, bupivacaine, prilocaine and articaine). Esters are no longer used as injectable anesthetics. However benzocaine is used as a topical anesthetic. Amides are the most commonly used injectable anesthetics. Postoperative pain control is frequently performed with the administration of short-acting local anesthetic and oral analgesics. Theoretically, pain control can be increased by using a local anesthetic with prolonged action.[1]

Lignocaine comes under the amide anesthetic group of local anesthetic agents. Lignocaine hydrochloride is most soluble in water and so this is most commonly used

injectable solution as local anesthetic agents.[2] The efficacy profile of lidocaine as a local anesthetic is characterized by a rapid onset of action and intermediate duration of efficacy. Therefore, lidocaine is suitable for infiltration, block, and surface anesthesia. Lidocaine or lignocaine along with adrenaline has the advantage of a rapid onset of action. Epinephrine (adrenaline) vasoconstricts arteries, reducing bleeding and also delays the resorption of lidocaine, almost doubling the duration of anesthesia. Bupivacaine is one of the most common long-acting anesthetic agents used in maxillofacial surgery for more than past 30 years mainly to reduce the pain even after a surgical procedure is over.[3] The present study was conducted with the aim to compare bupivacaine and lignocaine in single sitting root canal treatment.

## MATERIALS & METHODS

The present study was conducted in the department of Endodontics. It comprised of 50 patients of both genders. All patients were informed and written consent was obtained. Ethical clearance was taken prior to the study.
Data such as name, age, gender etc was recorded. Patients were randomly divided into 2 groups. In group I, 2% lignocaine was administered and in group II, 0.5% bupivacaine was administered. Root canal treatment was performed as per standard protocol. The pain in patients was compared using the visual analogue scale (VAS) before treatment and 4, 8, 16 and 36 hours after root canal treatment. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

## RESULTS

**Graph I Distribution of patients**

| Groups | Group I (2% Lignocaine) | Group II (0.5% Bupivacaine) |
|---|---|---|
| Number | 25 | 25 |

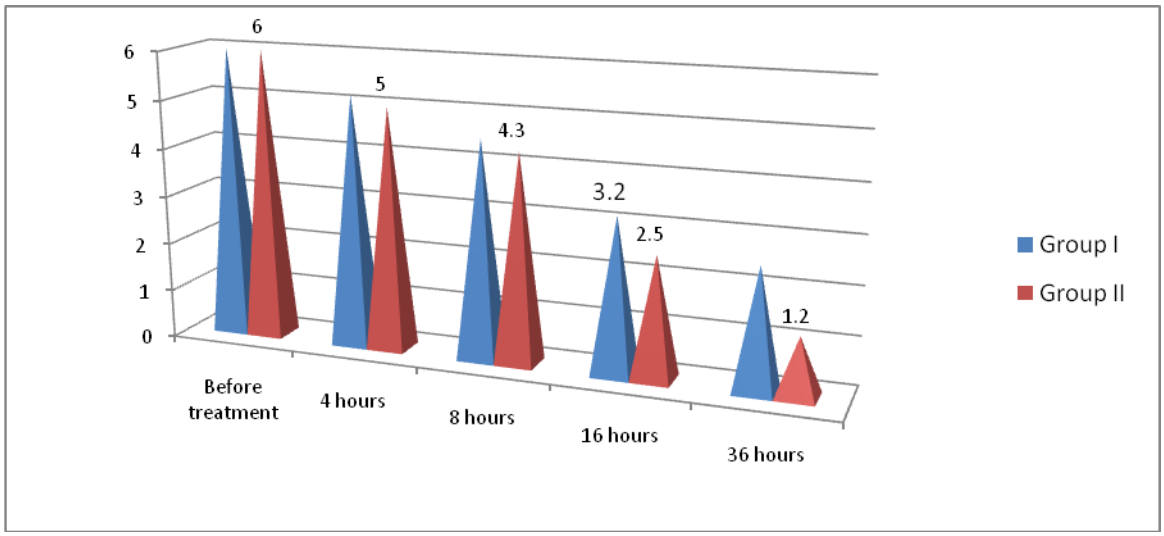
Table I shows that in group I patients, 2% lignocaine was administered and in group II patients, 0.5% bupivacaine was administered.

**Table II Assessment of VAS in both groups**

| Time | Group I | Group II | P value |
|---|---|---|---|
| Before treatment | 6 | 6 | 0.01 |
| 4 hours | 5.2 | 5.0 | |
| 8 hours | 4.5 | 4.3 | |
| 16 hours | 3.2 | 2.5 | |
| 36 hours | 2.5 | 1.2 | |

Table II, graph I shows that mean VAS before treatment in both group I was 6, at 8 hours was 4.5 in group I and 4.3 in group II, at 8 hours was 5.2 in group I and 5.0 in group II, at 16 hours was 3.2 in group I and 2.5 in group II and at 36 hours was 2.5 in group I and 1.2 in group II. The difference was significant (P< 0.05).

**Graph I Assessment of VAS in both groups**



## DISCUSSION

Local anesthetics block the generation and the conduction of nerve impulses, presumably by increasing the threshold for electrical excitation in the nerve, by slowing the propagation of the nerve impulse, and by reducing the rate of rise of the action potential.[4] In general, the progression of anesthesia is related to the diameter, myelination, and conduction velocity of affected nerve fibers. Clinically, the order of loss of nerve function is as follows: (1) pain, (2) temperature, (3) touch, (4) proprioception, and (5) skeletal muscle tone. Systemic absorption of local anesthetics produces effects on the cardiovascular and central nervous systems (CNS). At blood concentrations achieved with normal therapeutic doses, changes in cardiac conduction, excitability, refractoriness, contractility, and peripheral vascular resistance are minimal. However, toxic blood concentrations depress cardiac conduction and excitability, which may lead to atrioventricular block, ventricular arrhythmias, and cardiac arrest, sometimes resulting in fatalities. In addition, myocardial contractility is depressed, and peripheral vasodilation occurs, leading to decreased cardiac output and arterial blood pressure. Recent clinical reports and animal research suggest that these cardiovascular changes are more likely to occur after unintended intravascular injection of bupivacaine. Therefore, incremental dosing is necessary.[5] The present study was conducted with the aim to compare bupivacaine and lignocaine in single sitting root canal treatment.

In present study, in group I patients, 2% lignocaine was administered and in group II patients, 0.5% bupivacaine was administered. Local anesthetics appear to cross the placenta by passive diffusion. The rate and degree of diffusion are governed by (1) the degree of plasma protein binding, (2) the degree of ionization, and (3) the degree of lipid solubility. Fetal/maternal ratios of local anesthetics appear to be inversely related to the degree of plasma protein binding because only the free, unbound drug is available for placental transfer. Bupivacaine with a high protein binding capacity (95%) has a low fetal/maternal ratio (0.2–0.4). Depending upon the route of administration, local anesthetics are distributed to some extent to all body tissues, with high concentrations found in highly perfused organs such as the liver, lungs, heart, and brain. Pharmacokinetic studies on the plasma profile of bupivacaine after direct intravenous injection suggest a three-compartment open model.[6]

We found that mean VAS before treatment in both group I was 6, at 8 hours was 4.5 in group I and 4.3 in group II, at 8 hours was 5.2 in group I and 5.0 in group II, at 16 hours was 3.2 in group I and 2.5 in group II, and at 36 hours was 2.5 in group I and 1.2 in group II. Bupivacaine is considered to have a therapeutic ratio of 2:0 while lignocaine in combination with adrenaline has a therapeutic ratio of 2:3. Lignocaine is considered less toxic than bupivacaine. However, it has shown that the injection route alters the relative toxicity of local anesthetics.[7]

Brunetto[8] found out that the bupivacaine has a greater therapeutic ratio than lignocaine when used for surgical removal of impacted third molars. Studies have proved that long-acting bupivacaine can be safely administered for surgical removal of lower third molar and it does have a long period of analgesia postoperatively compared to lidocaine, but the cardio depressant property of bupivacaine should be kept in mind and should be administered judicially. Even studies have also shown that bupivacaine combined with methyl prednisolone reduced the postoperative pain and swelling compared with the use of lidocaine and placebo, lidocaine and methylprednisolone, or bupivacaine and placebo.[9,10]

## CONCLUSION

Authors suggested that both bupivacaine and lignocaine could be used in single sitting root canal treatment. However, 0.5% bupivacaine provided better results as compared to 2% lignocaine.

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