INTRODUCTION:
The perceived association of pain with oral surgical procedure is a great source of fear for many patients and can prevent them from seeking treatment. Controlling post-operative pain represents a meaningful challenge to many practitioners. Local anesthetics provide adequate pain relief for the majority of dental treatments, however, failures do occur. These may be the result of anatomical, pharmacological, pathological, psychological or technical or iatrogenic factors. Good anesthetic technique can considerably eliminate pain during treatments; but, post-treatment endodontic pain remains a significant predicament. Post-operative 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. A range of local anesthetic drugs have been used in dentistry. Lidocaine, the first commercialized amide local anesthetic, is still the most widely used anesthetic in some countries. It is considered as a reference for new local anesthetics. Clinical trials with long-acting anesthetic (bupivacaine and etidocaine) have been performed in patients undergoing oral surgery, endodontic treatment, and periodontal treatment. Bupivacaine, an amide-type local anesthetic, provides prolonged analgesia and is indicated when post-operative pain is anticipated. Its use in routine oral surgery is especially justified for lengthy surgical procedures or oral surgical extraction associated with predicted post-operative pain and discomfort. Hence, the present study was planned to compare efficacy of lidocaine with and without bupivacaine as a dental anesthetic for oral surgical procedures.

MATERIALS AND METHOD:
The study was conducted in the department of Oral and Maxillofacial surgery of the dental institution. The study was approved from the ethical committee of the institute. The selection of the subjects was done from the outpatient department who were scheduled for minor oral surgical procedures. Inclusion criteria for selection of patients were:

- Age ranging from 18-65 years
- No Systemic illness such as cancer, hepatitis, liver disease.
- Physical status according to American Society of Anesthesiologists ranged from 1 to 2.

A total of 20 patients were included in the study. An informed written consent was obtained from the participants after explaining them about the procedure of study. The patients were randomly grouped into two groups, Group 1 and Group 2 with 10 patients in each group. Each patient was given the anesthetic preparation according to the group. The operator was blinded to the preparation in the injection. For the evaluation of serum, blood was drawn from the pedis artery of the patients. The maximal serum concentration attained in Group 1 was 1.91 ± 0.6 µg/ml and in Group 2 was 1.02 ± 0.32 µg/ml. The difference in the results was significant. Conclusion: The combination of lidocaine + bupivacaine has long-lasting local anesthetic effect as compared to lidocaine alone.

Keywords: Bupivacaine, dental anesthesia, local anesthetic, lidocaine.
given injection of equal volumes of 2% lidocaine with 1/80,000 epinephrine and 0.5% bupivacaine. The operator was blinded to the preparation in the injection. For the evaluation of serum, blood was drawn from the pedis artery of the patients on 5 events:

1. Before administration of LA
2. At 1 min after completion of injection
3. At 5 min after completion of injection
4. At 15 min after completion of injection
5. At 30 min after completion of injection

The blood taken was immediately centrifuged at 3000 rpm for 20 min and serum was processed and analyzed. The analysis serum concentration of lidocaine and epinephrine in group 1 and bupivacaine in group 2 was done using high-performance liquid chromatography unit equipped with achemiluminescence detector.

The statistical analysis of the data was done using SPSS program for windows. The significance of the data was checked using Student’s t-test and Chi-square test. Statistically significant p value was predetermined to be less than 0.05.

RESULTS:
Table 1 shows the comparative evaluation of demographic variables between Group 1 and 2. No. of patients in both groups was 10 each. The mean age of patients in Group 1 was 41.8±10.2 years and in Group 2 was 43.2 ± 9.2 years. The difference was non-significant (p=0.302). Table 2 shows the comparison of maximal serum concentration attained in both groups. The maximal serum concentration attained in Group 1 was 1.91 ± 0.6 µg/ml and in Group 2 was 1.02 ± 0.32 µg/ml. The difference in the results was significant showing 2% lidocaine with 1/80,000 epinephrine and 0.5% bupivacaine is more effective [Fig 1].

Table 1: Comparison of demographic variables of Group 1 and 2

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of patients</th>
<th>Mean Age (years)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>10</td>
<td>41.8 ± 10.2</td>
<td>0.302</td>
</tr>
<tr>
<td>Group 2</td>
<td>10</td>
<td>43.2 ± 9.2</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Comparison of maximal serum concentration achieved in both groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Local anesthetic</th>
<th>Maximal serum concentration (µg/ml)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>2% lidocaine with 1/80,000 epinephrine</td>
<td>1.91 ± 0.6</td>
<td>0.03</td>
</tr>
<tr>
<td>Group 2</td>
<td>2% lidocaine with 1/80,000 epinephrine and 0.5% bupivacaine</td>
<td>1.02 ± 0.32</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Showing comparison of maximal serum concentration achieved in both groups
DISCUSSION:
In dentistry, bupivacaine is used mostly for surgery because it can provide 90 to 180 min of pulpal anesthesia and 4 to 9 hr of soft-tissue anesthesia when administered with conventional nerve block and infiltration techniques. Bupivacaine and other long-acting anesthetics have proven effective for the suppression of both intraoperative and postoperative pain.

The present study was conducted to compare lidocaine with and without bupivacaine. We observed that maximal serum concentrations were more in case of Group 2 (lidocaine + bupivacaine). The results were statistically significant. The results were consistent with other studies. Spivey WH et al conducted a study to determine the degree of anesthesia obtained during and after repair of lacerations using lidocaine 1% versus bupivacaine 0.25%, a long-acting local anesthetic. Lidocaine and bupivacaine were administered in a double-blind, randomized fashion to 104 patients. Each patient was asked to rate his pain on a 0 to 10 scale (0, no pain; 10, severe pain) prior to administration of the anesthetic. They then rated pain on an identical scale at 30 minutes, and one, two, three, four, five, six, 12, 18, and 24 hours after completion of suturing. The mean baseline pain was 2.96 for the lidocaine group and 3.07 for the bupivacaine group. This decreased to less than 1.0 in both groups 30 minutes after infiltration. It remained low for the bupivacaine group for the next five hours, but increased almost to preanesthesia levels by two hours in the lidocaine group. A three-way analysis of variance revealed a significant difference (P less than .001) between the pain response of the two groups. There was no statistical difference (P greater than .05) between the age of the patients, size of laceration, and amount of drug used. The study shows that patients do experience pain after a wound is sutured and the anesthetic has worn off. It also demonstrates that bupivacaine significantly reduces the pain a patient may experience after repair of a wound. Lai F et al compared the efficacy of a mixture of L-bupivacaine 0.75% and lidocaine 2% with bupivacaine 0.75% and lidocaine 2% for peribulbar anesthesia in cataract surgery. Ninety patients were allocated randomly to receive 8 ml of a mixture of equal parts of bupivacaine 0.75% and lidocaine 2% or an equal volume of L-bupivacaine and lidocaine 2%. Hyaluronidase 15 IU ml−1 was added to both solutions. There were significant differences between the groups in clinical end-points. The median time at which the block was adequate to start surgery was 4 min (interquartile range 4–8 min) in the bupivacaine group and 8 min (5–12 min) in the L-bupivacaine group (P=0.002). Median ocular and eyelid movement scores were similarly significantly decreased in the bupivacaine group compared with the L-bupivacaine group at all times (P≤0.03). There was no difference between groups in the incidence of minor complications. The authors concluded that a mixture of bupivacaine 0.75% and lidocaine 2% provides faster onset time than a mixture of L-bupivacaine 0.75% and lidocaine 2%. Valvano MN et al compared the efficacy, degree of discomfort, and time elapsed before anesthesia of digital block with a combination of 1% lidocaine/25% bupivacaine and with 0.25% bupivacaine alone. They carried out a randomized, double-blinded, prospective study in which subjects served as their own controls. The study group comprised 19 normal adult volunteer medical students and members of the community who volunteered to participate in a study evaluating “the use of commonly used local anesthetics by physicians.” Two digital blocks were performed on each subject: one with a lidocaine/bupivacaine combination and one with bupivacaine alone. Two subjects did not complete the study; therefore 34 blocks were performed. Both the physicians and subjects were blinded to the anesthetic used for each block. Patients immediately rated the pain associated with each technique on a standard visual analog scale. Time elapsed before onset of anesthesia to pinprick was assessed and recorded after each block in 1-minute increments. Mean visual analog scale pain scores were not different between the two types of blocks: 3 cm for lidocaine/bupivacaine and for bupivacaine alone. Time elapsed before anesthesia to pinprick was not significantly different between the groups: mean, 5.0 minutes for lidocaine/bupivacaine and 5.35 minutes for bupivacaine alone. They concluded that bupivacaine 0.25% digital block induces anesthesia in the same period of time and with equivalent pain of injection as a 1:1 lidocaine 1%/bupivacaine 0.25% combination. It is not necessary to use lidocaine/bupivacaine in an attempt to achieve faster onset of local anesthesia. Moradi S et al evaluated the efficacy of a long acting anesthesia, bupivacaine, on preventing post-operative pain associated with endodontic treatment, and to compare it with lidocaine. This study was a double blind and randomized clinical trial on 30 patients’ anterior maxillary teeth. The patients were divided into two groups of fifteen. One group was administered lidocaine (2% with 1:100000 epinephrine) local anesthesia and the other group was given bupivacaine (0.5% without epinephrine). The pain in patients were compared using the visual analogue scale (VAS) at definite times i.e. before treatment, during treatment and 2, 4, 6, 8, 10, 12, 24, 36 and 48 hours after operation. Data were analyzed using One-way ANOVA tests. Bupivacaine significantly decreased postoperative pain compared to lidocaine. Postoperative pain was directly related to preoperative pain. Women reported more pain, though significant difference in postoperative pain report was not found between different ages. In conclusion, a single dose of bupivacaine 0.5% used in infiltration anesthesia could be more effective in reduction or prevention of post-operative endodontic pain compared with lidocaine.
CONCLUSION:
From the results, we conclude that the combination of lidocaine + bupivacaine has long-lasting local anesthetic effect as compared to lidocaine alone.

REFERENCES:
16. Lai F, Sutton B, Nicholson G. Comparison of L-bupivacaine 0.75% and lidocaine 2% with bupivacaine 0.75% and lidocaine 2% for peribulbar anaesthesia. British Journal of Anaesthesia, Volume 90, Issue 4, 1 April 2003, Pages 512–514.

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Conflict of interest: None declared
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