Effect of Different Nerve Block of Local Anesthetics with Epinephrine on Selected Cardiovascular Parameters
Bijaraniya Kuldeep¹, Kumar Ravindra²,
1Senior demonstrator, Department of Physiology, S.P. Medical College, Bikaner, Rajasthan, India
2Dental Surgeon, Ratna Dental Hospital, Bikaner, Rajasthan, India.

Abstract: Lignocaine can also be used for nerve blocks. Lidocaine, also known as xylocaine or lignocaine is a medication used to numb tissue in a specific area and to treat ventricular tachycardia. Sixty subjects (15 female, 45 male) in the 18–40 years old range, without history of systemic disease and no medications in the previous 6 months with normal BP (≤140/90) were selected for this study. Subjects were divided into two groups: in the first group, the infiltration method (upper arch teeth) and in the second group, inferior alveolar nerve block technique (lower arch teeth) was applied. The mean systolic and diastolic BP was increased after injection of lidocaine with epinephrine in the both maxillary and mandibular nerve block methods. The differences were statistically significant (P < 0.05). The mean HR was increased after injection of lidocaine with epinephrine in the both maxillary and mandibular nerve block methods. The differences were statistically significant (P < 0.05).

Keywords: lidocaine, adrenaline, mandibular nerve block, maxillary nerve block

INTRODUCTION

Benzodiazepines have long been considered the base of anxiolytic pharmacotherapies. Lidocaine, also known as xylocaine and lignocaine is a medication used to numb tissue in a specific area and to treat ventricular tachycardia[1]. Anxiety and stress are experienced by many patients during dental treatment. Because this is a major health problem, much study has been done to measure the body's physiologic response to routine dental procedures. Although pain during dental procedures can be readily controlled with local anesthesia, psychological stress of the clinical environment, the discomfort associated with oral injections, and the annoyance of oral manipulations, together with fear, may produce varying degrees of non-detectable clinical cardio-circulatory changes[2–4].

Anxiety experienced during a dental visit may cause parasympathetic dominance, with bradycardia and/or syncope[5,6] or even cardiac arrhythmias[7]. Healthy patients are usually able to tolerate these physiologic responses which are due to stress; however, patients with hypertension, heart disease, cerebrovascular disease, or increased age may have a diminished tolerance to stress[8].

Lidocaine mixed with a small amount of adrenaline (epinephrine) is available to allow larger doses for numbing, to decrease bleeding, and to make it last longer. When used as an injectable, it typically begins working within four minutes and lasts for half an hour to three hours[9]. Lidocaine may also be applied directly to the skin for numbing[1]. Lidocaine is available in various forms like injection, cream, gel and spray and in different concentrations of 0.5%, 1%, 2%, 5% and 10%[10].

The purpose of the present study was to compare the effects of 2% lidocaine with epinephrine on BP and HR in two types of different nerve block. The main aim was to verify the effects of lignocaine with epinephrine on vital cardiac parameters.

MATERIAL AND METHOD

The subjects were recruited from Ratna dental hospital Bikaner Rajasthan between January 1 and June end of 2017. Sixty subjects (25 female, 35 male) in the 18–40 years old range, without history of systemic disease and no medications in the previous 6 months with normal BP (≤140/80) were selected for this study. Subjects were divided into two groups: in the first group, the infiltration method (upper arch teeth) and in...
the second group, inferior alveolar nerve block technique (lower arch teeth) was applied. Each subject was asked to take rest for at least 5 min before measuring the BP and HR. Then, immediately before and at least 10 min after injection, systolic and diastolic BP and HR were measured.

**ANALYSIS OF OBSERVATIONS**

Analysis was done by statistical analysis. Students’ t test (two tailed) has been used to find the significance. P=0.05 was considered as statistically significant.

**RESULT**

Table-1: Effect of mandibular nerve block on blood pressure and heart rate

<table>
<thead>
<tr>
<th></th>
<th>BEFORE INJECTION</th>
<th>AFTER INJECTION</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTOLIC BLOOD PRESSURE</td>
<td>121.76±5.97</td>
<td>125.26±5.39</td>
<td>0.02</td>
</tr>
<tr>
<td>DIASTOLIC BLOOD PRESSURE</td>
<td>85±4.02</td>
<td>87.26±4.15</td>
<td>0.03</td>
</tr>
<tr>
<td>HEART RATE</td>
<td>75.8±4.31</td>
<td>78.8±7.00</td>
<td>0.05</td>
</tr>
</tbody>
</table>

The mean systolic, diastolic BP and heart rate were increased after injection of lidocaine with epinephrine in the maxillary nerve block method. The differences were statistically significant (P < 0.05).

Table-2: Effect of Maxillary nerve block on blood pressure and heart rate

<table>
<thead>
<tr>
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<th>BEFORE INJECTION</th>
<th>AFTER INJECTION</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTOLIC BLOOD PRESSURE</td>
<td>121.7±6.81</td>
<td>125.8±7.54</td>
<td>0.03</td>
</tr>
<tr>
<td>DIASTOLIC BLOOD PRESSURE</td>
<td>82.13±4.16</td>
<td>86.13±6.12</td>
<td>0.004</td>
</tr>
<tr>
<td>HEART RATE</td>
<td>77.1±5.06</td>
<td>80.43±5.48</td>
<td>0.01</td>
</tr>
</tbody>
</table>

The mean systolic, diastolic BP and heart rate were increased after injection of lidocaine with epinephrine in the maxillary nerve block method. The differences were statistically significant (P < 0.05).

Table-3: Effect of different nerve block after lignocaine on blood pressure and heart rate

<table>
<thead>
<tr>
<th></th>
<th>Maxillary nerve block</th>
<th>Mandibular nerve block</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTOLIC BLOOD PRESSURE</td>
<td>125.8±7.54</td>
<td>125.26±5.39</td>
<td>0.07</td>
</tr>
<tr>
<td>DIASTOLIC BLOOD PRESSURE</td>
<td>86.13±6.12</td>
<td>87.26±4.15</td>
<td>0.04</td>
</tr>
<tr>
<td>HEART RATE</td>
<td>80.43±5.48</td>
<td>78.8±7.00</td>
<td>0.19</td>
</tr>
</tbody>
</table>

The mean systolic was increased after injection of lidocaine with epinephrine in the both type of nerve block method. The differences were statistically insignificant (P >0.05). The mean HR and diastolic blood pressure were increased after injection of lidocaine with epinephrine in the both type of nerve block method. The differences was statistically insignificant (P >0.05).

**DISCUSSION**

Variations of cardio circulatory parameters during dental treatment have long been a major concern for dentists and researchers. Several authors have reported significant changes that might affect physiologic stability in normoactive patients, and particularly in those with circulatory disease[11], as well as elderly patients[2]. Both laboratory research[12] and clinical research have evaluated changes occurring during dental procedures, in pre-, trans-, and postoperative periods[13]. Tranquilizing drugs can be used to control autonomic nervous system responses, and to help minimize cardio circulatory alterations[2]. The effectiveness of this group of drugs has been tested for catecholamine’s and other vasoconstrictors in local anesthetics[14].

The findings of this research were mostly in agreement with studies by Meral et al.[15], Silvestre et al.[4], and Faraco et al.[16] all of which showed a small but not clinically important increase in cardiovascular parameters after injection of LA with epinephrine (BP, PR and HR).

Frabetti et al.[17] conducted a study with 14 patients whether the epinephrine in the local anesthetics carries cardiovascular risks. The systolic and the
diastolic blood pressure were analyzed, as well as the average and the maximal heart rate. The comparison of the initial blood pressure and the one after the post-anesthetic period showed insignificant tendency towards increasing the systolic pressure and slightly more statistically significant increased diastolic blood pressure. The heart frequency increases only in small number of the patients, however, not more than 10 beats per minute. In general, the group of the studied patients showed a statistically decrease in the average and the maximal heart rate from the beginning to the end of the session. Thus, the dosages of epinephrine administered to these patients result in insignificant changes in the heart rate and blood pressure. The decrease of the heart rate at the end of the therapy underlines the important role of the autonomic nervous system in the modulation of the cardiovascular response during dental therapy.

On the other hand, Faraco et al.[18] studied the cardiovascular effects produced by intravascular injection of 2% lidocaine with 20 μg/mL of norepinephrine on systolic, diastolic and mean arterial pressure and HR of rats, and the results showed significant increases in systolic, diastolic and mean arterial pressure and a noticeable decrease in HR.

In the search of anesthetics with optimal effect, studies are comparing not only the different types of anesthetics, but also the different types of vasoconstrictors[19]. In study of Sumer et al. [20] was compared the pain from injection during administration of Articaine with adrenaline, Prilocaine with Felypressin, and Lidocaine with adrenaline. 497 patients anesthetized intraorally with different solutions were included. The patients were evaluated subjectively and asked to rate their injection pain on a six-point scale. After analyzing the results, the authors concluded that there was no statistically significant difference between the pain felt during injection of three types of solutions. Referring to literature sources, according to which solutions with low pH are taken much more painfully, authors considered that the result is due to the similar pH of the solutions. Many authors emphasize the role of the injection method for more successful anesthesia of patients[21,22], and other conduct research aiming at optimisation of the protocols for work with medically compromised patients 23-25.

CONCLUSION
In the present study, anaesthetic solutions containing adrenaline showed similar reaction for cardiovascular parameters and were found to be safe for routine use in dentistry for normotensive subjects.

REFERENCES

Available online at http://saspublisher.com/sjams/