

## Comparative Assessment of Heart Rate Changes with Administration of Two Different Anesthetic Agents in Pediatric Patients: A Prospective Study

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### ABSTRACT

**Background:** Local anesthetic drugs, by disrupting nerve conduction lead to a temporary numbness into the specific area of the body. The present study was conducted to compare two different anesthetics and their effect on heart rate in children.

**Materials & Methods:** The present study was conducted on 82 children age <18 years of both genders. Patients were divided into 2 groups of 41 each. Group I received 2% lidocaine with adrenaline 1: 80000 and group II received 3% Mepivacaine. In both groups heart rate was recorded before and after injection and compared.

**Results:** Out of 82 patients, males were 42 and females were 40. Heart rate was 76.2 beats/ min before and 84.1 beats/ min after injection. In group II, heart rate was 81.5 beats/ min before and 82.7 beats/ min after injection. The difference was significant ( $P < 0.05$ ).

**Conclusion:** There was more change in heart rate after

injection of lidocaine with adrenaline, whereas mepivacaine did not alter heart rate.

**Key words:** Children, Heart Rate, Lidocaine.

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### INTRODUCTION

Pain is an unpleasant sense and the common clinical experience in dental offices, thus eliminating this feeling of the patient is important.<sup>1</sup> The main drug used to reduce and eliminate the pain to control the patient for therapeutic procedures is anesthesia drugs. Local anesthetic drugs, by disrupting nerve conduction lead to a temporary numbness into the specific area of the body.<sup>2</sup> Due to the preservative materials it might have adverse side effects beside the beneficial effects. Vasoconstriction is the most common compounds that are added to the anesthetic drugs.

Local anesthetic agents are chemicals that reversibly block the transmission<sup>1</sup> of action potential of nerve membrane.<sup>3</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, lidocaine being the gold standard available with the wide selection of vaso-constrictive agents that improve the clinical efficacy and the duration LA.<sup>4</sup>

The two most commonly used local anesthetic drugs are Lidocaine (at concentrations of 5.0%, 2%) and Mepivacaine. Lidocaine is used in order to topical anesthesia, infiltration injection and nerve block and also has antiarrhythmic properties. The Mepivacaine activity is basically the same as Lidocaine but it

cannot penetrate into the tissues less than lidocaine and also its activity duration is much longer.<sup>5</sup> The present study was conducted to compare two different anesthetics and their effect on heart rate in children.

### MATERIALS & METHODS

The present study was conducted in the Department of Pediatrics, Gujarat Adani Institute of Medical Sciences, Bhuj (Kutch), Gujarat, India. A total of 82 children of less than 18 years of age were enrolled in the present study. Patients were informed regarding the study and written consent was obtained. Ethical clearance was taken prior to the study.

General information such as name, age, gender etc was recorded. Patients were divided into 2 groups of 41 each. Group I received 2% lidocaine with adrenaline 1: 80000 and group II received 3% Mepivacaine. In both groups heart rate was recorded before and after injection and compared. Results thus obtained were subjected to statistical analysis.  $P$  value less than 0.05 was considered significant.

### RESULTS

Table I shows that out of 82 patients, males were 42 and females were 40. Table 2 shows that group I received 2% lidocaine with

adrenaline 1: 80000 and group II received 3% Mepivacaine. Table 3, graph 1 shows that heart rate was 76.2 beats/ min before and 84.1 beats/ min after injection. In group II, heart rate was 81.5 beats/ min before and 82.7 beats/ min after injection. The difference was significant ( $P < 0.05$ ).

**Table 1: Distribution of patients**

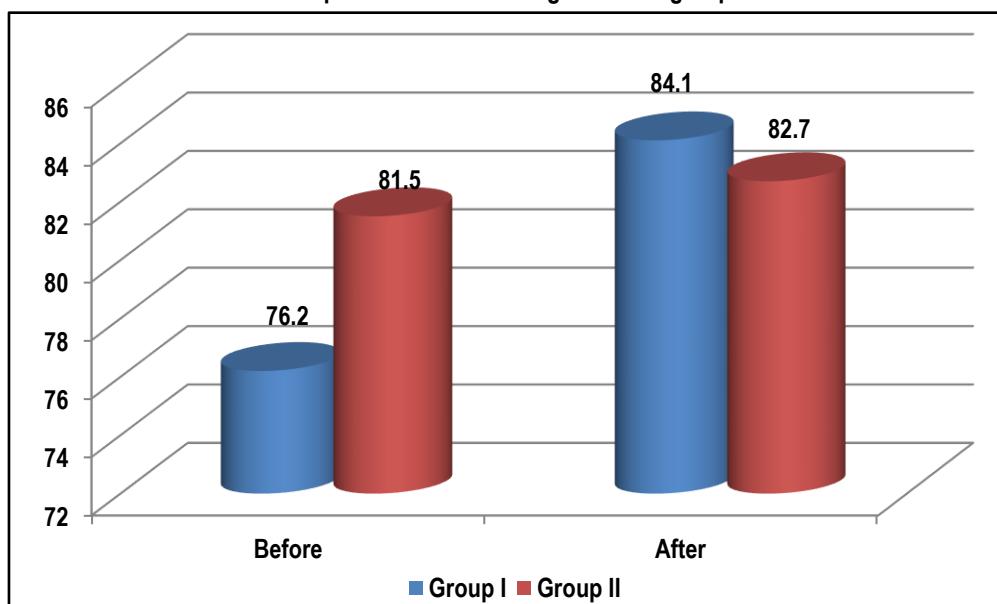
Gender	Males	Females
Number	42	40
Percentage of patients	51.22	48.78

**Table 2: Distribution in groups**

Group	Group I	Group II
Agent	2% Lignocaine	3% Mepivacaine
Number	21	21

**Table 3: Heart rate changes in both groups**

Group	Group I	Group II	P value
Before	76.2	81.5	0.01
After	84.1	82.7	0.05
P value	0.01	0.91	

**Graph 1: Heart rate changes in both groups**

## DISCUSSION

In the human body, the Mepivacaine activity is basically the same as Lidocaine but it cannot penetrate into the tissues less than lidocaine and also its activity duration is much longer. Its potency is equal to lidocaine and its toxicity can also be equal or slightly less than Lidocaine. This drug is available in 3% concentration with no vasoconstriction substance.<sup>6</sup>

Whereas the local anesthetic drugs have pressure vessel materials, thus they could lead to pathological conditions in people with neurological diseases or patients with cardiovascular problems.<sup>7</sup> Adrenaline has the ability to vasoconstriction could increase the duration and the depth of anesthesia and also could reduce the possible bleeding in the site. Although they are considered as its positive effects but the adrenalin impact on the sympathetic activities might be associated with the various adverse side effects indeed.<sup>8</sup> The present study was conducted to compare two different anesthetics and their effect on heart rate in children.

In present study, out of 82 patients, males were 42 and females were 40. Group I received 2% lidocaine with adrenaline 1: 80000 and group II received 3% Mepivacaine. Hanvold et al<sup>9</sup> found that patients were randomly assigned to two groups. We used Lidocaine 2% + 1:80000 Epinephrine cartridge for one group and Mepivacaine 3% cartridge for the other group. Heart rate Systolic and Diastolic blood pressure was recorded for patients

before and after the injection, all data was analyzed statistically. In this study we studied 182 patients in two groups, the groups were matched for gender and age. The mean heart rate of patients before and after Lidocaine + Epinephrine injection had a significant difference, however there was no significant difference in the heart rate of patients before and after Mepivacaine injection. The mean systolic and diastolic blood pressure of patients before and after injection of Lidocaine + Epinephrine was significantly different, the difference between diastolic and systolic blood pressure before and after Mepivacaine injection was not statistically meaningful. The difference in changes of pulse rate systolic and diastolic blood pressure was significantly different in two groups.

We observed that heart rate was 76.2 beats/ min before and 84.1 beats/ min after injection. In group II, heart rate was 81.5 beats/ min before and 82.7 beats/ min after injection. Santos et al<sup>10</sup> found that 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 concentrations. 2% lignocaine with 1:80000 adrenaline concentration has significantly increased the heart rate and blood pressure especially systolic compared with the lignocaine with 1:200000. Bayat and colleagues<sup>11</sup> investigated the hemodynamic changes following the use of Lidocaine and

Mepivacaine + epinephrine in the patients and stated that after injection of Lidocaine + epinephrine, the 12.25 beats were added to the heart rate every per minute and this change is very significant so Lidocaine + epinephrine combination is significantly leads to heart rate increase in these cases.

## CONCLUSION

Authors found that with lignocaine having added adrenaline, there was more change in heart rate after injection whereas mepivacaine did not alter heart rate.

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