Effects of lignocaine with adrenaline on blood pressure and pulse rate in normotensive and hypertensive patients undergoing extraction: A clinical study

Anil Kumar Karanam[1*], Bujunuru Sridhar Reddy[2]

[1]Assistant Professor, [2]Associate Professor, [1]Dept. of Oral & Maxillofacial Surgery, Govt Dental College and Hospital, Kadapa, [2]Associate Professor, Dept. of Oral & Maxillofacial Surgery, Govt Dental College and Hospital, Hyderabad

***Corresponding Author:**
Email: anil_karanam@yahoo.com

Abstract

Objective: This study is intended to study the effects of Local Anaesthesia containing adrenaline (vasoconstrictor) on Blood pressure and pulse rate in hypertensive patients and to ascertain the safety of using Local Anaesthesia with adrenaline in such patients.

Materials & Methods: The present study has been carried out in Rajiv Gandhi Institute of Medical Sciences, Adilabad from January 2011 to December 2012. The study included 100 male patients, 24 to 60 years of age who underwent extraction of firm mandibular molar tooth. Out of 100 male patients, 50 patients were normotensive patients with systolic blood pressure of <120 mm of Hg and diastolic blood pressure of < 80 mm of Hg and remaining 50 patients were Hypertensive patients out of which 25 patients had Stage I Hypertension (SBP 140 – 159 mm of Hg & DBP 90 – 99 mm of Hg) and 25 patients had Stage II Hypertension (SBP >160 mm Hg & DBP >100 mm Hg). All patients were given Inferior Alveolar Nerve Block followed by Lingual & Long Buccal Nerve Blocks with 2% Lignocaine with 1:2, 00,000 Adrenaline. The Blood pressure and pulse rate were recorded 6 times.

Results: All patients showed a considerable increase in Systolic and Diastolic BP recorded at 2 min but gradually showed a reduction until 60 min post-operatively. The pulse rate also shown a sudden increase followed by gradual reduction to preoperative level.

Conclusion: All patients showed a considerable increase in blood pressure and pulse rate but not significantly which may be attributed to stress induced by dental extraction.

Keywords: Blood pressure, hypertensive, local anaesthesia, normotensive.

Introduction

It is known that pain during dental treatments can trigger endogenous catecholamine release, which in turn can give rise to hemodynamic changes, such as increase in blood pressure and heart rate, and may even produce arrhythmias.[1]

The main drug used to reduce and eliminate the pain to control the patient for therapeutic procedures is Local anaesthesia. The use of local anesthetics in combination with vasoconstrictor agents is justified in dentistry [2,3] Doing so counteracts the local vasodilation effect of local anesthetic agents and delays its absorption into the cardiovascular system. These effects are beneficial in increasing the duration of local anesthesia and diminishing the risk of toxicity and also provide hemostasis during surgery.[4,5]

Hypertension represents one of the most common histories presented by patients in dental clinics. Additionally, increase in blood pressure is common during dental surgery.[6] The objective of this study was to evaluate and compare the changes in blood pressure and pulse rate in normotensive and hypertensive patients undergoing dental extraction using 2% Lignocaine Hydrochloride with 1:2,00,000 Adrenaline.

Materials and Methods

The study was conducted on 100 male patients (24-60 years; mean age of 40.3 ± 3.9 years) who underwent dental extraction at Rajiv Gandhi Institute of Medical Sciences, Adilabad.

After obtaining institutional ethical committee clearance. The patients were divided into three groups based upon their medical history and Blood pressure recordings in the outpatient department: Group I - 50 Normotensive patients (BP < 120/80 mm of Hg); Group II - 25 patients with Stage I Hypertension (BP 140-159/90-99 mm of Hg); Group III - 25 patients with Stage II Hypertension (BP >160/100 mm of Hg).

The following inclusion criteria were established: all male patients to eliminate gender bias; patients presented with medical history of prediagnosed hypertension and on anti-hypertensive drugs and reportedly certified as well controlled hypertension without any associated CVS problems by their respective physicians; uncomplicated extractions were planned only of mandibular molars without any sequelae of pulpitis; with an history of extraction and lastly willing to participate in the study.

All the patients were explained and written informed consent were obtained. Preoperative antibiotics and analgesics were prescribed and patients were advised to start the night before dental extraction. The procedures were performed in morning sessions without any preoperative anxiolytics. On the day of extraction, the patients were made to sit in a calm waiting room. BP and pulse rate were recorded using a Multi-para Monitor twice: immediately after reporting

and after 15 min of reporting; the lowest of both the readings was considered as baseline BP and pulse rate.

All the patients were given Inferior Alveolar Nerve Block with Lingual Nerve Block and Long buccal nerve block using 4 ml of 2% Lignociane Hydrochloride with 1:200000 Adrenaline. The patients were made to sit in dental chair and Blood pressure and pulse rate were recorded immediately before Injection of LA, 2 minutes after Injection, 5 minutes after injection, 30 minutes after injection, 60 minutes after injection using the same Multi-para monitor.

Out of 100 male patients, the mean ages for normotensive patients, Stage I Hypertensive and Stage II hypertensive patients was 29 ± 3.16; 39.56 ± 4.29 and 50.32 ± 3.90 years respectively.

All the patients showed an elevation of Blood pressure by 2-3 mm of Hg and mean pulse rate of 1-2 beats from baseline to immediately before injection, followed by elevation 4-5 mm of Hg 2 min after injection and 5 min after injection and gradually shown a fall after 30 min and 60 min after injection. (Table 1)

Results

Table 1: Mean Blood Pressure (± SD) and Pulse Rate Before and After Extraction Using 2% Lidocaine with 1:2, 00, 000 Adrenaline

	Baseline BP & Pulse Rate	Before Injection of LA with Adrenaline	2 Minutes after Injection	5 Minutes after Injection	30 Minutes after Injection	60 Minutes after Injection
NORMOTENSIVE PATIENTS (n=50)						
Systolic BP	108.04 ± 3.24	110.64 ± 4.14	115.88 ± 3.82	115.88 ± 3.82	111.44 ± 3.42	108.04± 3.24
Diastolic BP	70.80 ± 3.86	73.76 ± 3.75	75.28 ± 2.47	74.40 ± 3.18	74.04 ± 3.69	70.80 ± 3.86
Pulse Rate	69.36 ± 5.32	71.76 ± 5.34	73.36 ± 5.32	74.44 ± 4.21	74.20 ± 4.08	69.36 ± 5.32
STAGE – I HYPERTENSIVE PATIENTS (n=25)						
Systolic BP	148.20 ± 5.09	149.16 ± 5.74	152.92 ± 6.29	152.92 ± 6.29	151.28 ± 5.82	148.20± 5.09
Diastolic BP	91.74 ± 1.87	92.24 ± 1.60	93.32 ± 2.31	93.32 ± 2.31	93.04 ± 2.61	91.74 ± 1.87
Pulse Rate	87.40 ± 3.19	88 ± 3.39	91.20 ± 2.93	91.52 ± 2.61	91.52 ± 2.61	87.40 ± 3.19
STAGE – II HYPERTENSIVE PATIENTS (n=25)						
Systolic BP	164.48 ± 4.02	165.80 ± 3.94	167.68 ± 3.86	166.76 ± 4.24	166.08 ± 3.55	164.48± 4.02
Diastolic BP	93.32 ± 2.31	100.20 ± 0.96	93.32 ± 2.31	93.32 ± 2.31	93.32 ± 2.31	93.32 ± 2.31
Pulse Rate	85.96 ± 4.62	87.40 ± 3.19	91.20 ± 2.93	90.36 ± 3.95	89.84 ± 3.49	85.96 ± 4.62

Discussion

This study primarily evaluated the effect of 2% Lignocaine with 1:2,00,000 Adrenaline on blood pressure and pulse rate on normotensive and hypertensive patients. The measurement of these parameters was performed at 6 different intervals. Patients with Hypertension are considered high risk group when administering dental local anaesthesia containing a vasoconstrictor because of the potential to undergo adrenaline induced sudden dramatic increase in blood pressure leading to life-threatening hypertensive crisis.[7,8]

Some studies have shown that while adrenaline injected as a vasoconstrictor is associated with transient effects in normotensive patients, hemodynamic complications could develop in uncontrolled hypertensive subjects, with possible cardiovascular accidents though such problems would be related to the dose of vasoconstrictor administered and to the local anesthesic used.[1,5] However, in the present study all the subjects, irrespective of normotensive or hypertensive, showed a significant increase in Systolic Blood pressure and a mild increase in Diastolic Blood pressure. This could be either because of vasoconstrictor effect or anxiety or discomfort due to the dental extraction.

Similarly, Silvestre et al[5] reported no significant changes were observed in any of the study parameters. The patients subjected to local anesthesia with a vasoconstrictor showed behaviour similar to that observed in an earlier study by our group in patients without hypertension. In another study, Mostafa et al[9] the differences of diastolic blood pressure, heart rate and oxygen saturation after anesthetia and after extraction showed no significant difference among three groups.

In a similar study, Matsumura et al[10] concluded that dental surgery using local anaesthesia caused significant increases in systolic blood pressure and pulse rate, and the increase in systolic blood pressure was greater in the middle-aged and the older patients. Factors other than the sympathetic input to the heart contribute to the increase in blood pressure during dental surgery.

In a similar study, Chaudhry et al[11] concluded that within the limitations of the study, a decrease in SBP was observed with use of two 1.8ml cartridges of lignocaine with 1:100000 epinephrine in patients suffering from stage 2 hypertension. This decrease was

not associated with adverse effects when observed changes in BP and PR noted among the patients of this study.

Cardiovascular disadvantages attributed to the use of epinephrine in hypertensive patients are negligible compared to their benefits. Painful extraction in a hypertensive patient can result in increased stress which in turn can lead to over production of endogenous epinephrine by the body.[12,13] This could prove far more dangerous to the patients

Conclusion

To conclude, the results obtained in this study hereby affirm that the rise in the blood pressure and pulse rate in normotensive as well as hypertensive patients is attributed to stress from dental extraction induced by anxiety or discomfort and not because of vasoconstrictor used in the local anaesthesia. This affirms the fact that local anaesthesia containing vasoconstrictor can be safely used in both healthy and hypertensive patients.

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