Original Article

Evaluation of Local Anesthesia Effect "Lidocaine +Epinephrine and Perilocaine s+Felypressin" on Blood Glucose level after Simple Extraction

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Abstract

Purpose: The aim of present study was to compare blood glucose level after simple dental extraction using local anesthesia (Lidocaine +epinephrine and Prilocaine +felypressin). **Methods:** This is a uni-blind randomized clinical trial study. Blood glucose level was measured in subjects who underwent a simple extraction in the posterior of the mandible. Subjects randomly divided into two groups. In the group 1, subjects received lidocaine and epinephrine (1.8 ml-1/80000) and lidocaine with felypressin (1.8 ml -0.03 IU/ml) in the group 2. Blood glucose level was measured 30 min before extraction and 30 min after it. **Results:** Sixty subjects were studied in two groups. Evaluation of the data did not show any significant change before and after extraction in each group. Comparison blood glucose level between two groups did not demonstrated any statistically difference. (P>0.05) There was not any correlation between blood glucose change and age in each group. (P>0.05). **Conclusion:** It seems exogenous epinephrine or felypressin may not affect blood glucose level after the simple tooth extraction. However, using local anesthesia with a higher volume of vasoconstrictors could be administrated cautiously.

Keywords: blood glucose, Lidocaine, Epinephrine, Perilocaine s, Felypressin

Introduction

Pain is a nearly ubiquitous phenomenon—a fact of everyday life. Pain is the chief symptom that brings patients to dental or medical attention. Local anaesthetics are frequently used by the dental surgeon to control intra-operative pain. An oral surgeon has to use local anaesthetics for most minor surgical procedures. Increase in stress, decrease in physical activity, irregular food habits, consumption of nutritionally poor food have a detrimental effect on a person's health. [1] The systemic effects attributable to the injection of dental local anesthetic solutions have been the subject of discussion for many years. [1] Most of the debate has been concerned with the effects of the vasoconstrictor component in both healthy and medically compromised patients. [2] The inclusion of epinephrine in dental local anesthetic solutions increases anesthetic efficacy in relation to both vasoconstrictor-free and felypressin-containing solutions. [3]

Some believe that the greater anesthetic effect obtained with epinephrine-containing solutions decreases endogenous catecholamine release. [2] It is suggested that exogenous epinephrine added to a local anesthetic may stimulate the presynaptic beta2 receptors on sympathetic nerve endings and on the adrenomedulla, and accelerate the release of endogenous epinephrine. [4] Some reports have demonstrated that the vasoconstrictor effect of catecholamines may be amplified by felypressin. Thus, the association of felypressin and epinephrine with local anesthetics may be indicated to achieve more effective vasoconstrictor actions with fewer collateral effects from both the anesthetic and the vasoconstrictor. [5]

Felypressin has been added to local anesthetic to increase the length of the anesthetic effect and reduce toxicity during dental procedures. However, the effect on blood glucose

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remains uncertain, and this may be highly relevant in the dental treatment of diabetic patients. [6] The question here would be whether the rise in glucose levels is being caused by the exogenous administration of epinephrine in the local anaesthetic that is injected or is it because of a rise in the body's endogenous secretion of adrenaline due to stress, and whether the amount of epinephrine in the dental local anaesthetic solution is enough to cause a systemic rise in blood glucose level (BGL).

The aim of present study was to compare blood glucose level after simple dental extraction using local anesthesia (Lidocaine +epinephrine and Prilocaine +felypressin)

Methods

This is a uni-blind randomized clinical trial study to evaluate *blood glucose change* ***after*** a simple extraction in the posterior of the mandible using local anesthesia (Lidocaine +epinephrine and Prilocaine +felypressin) between February 1, 2013 and May 31, 2013. The research committee of the medical ethics group of Shiraz Medical Science University approved this study. Subjects eligible for study inclusion was ASA I category and underwent a simple tooth extraction. Subjects were removed the study if they were NPO or used any drugs before the procedure. All dental appointments were between 9 and 11 am in the dental faculty. Blood glucose was measured 30 minutes before the procedure and 30 minutes after it. Subjects were randomly aligned into two groups: group1 received Lidocaine 2% +epinephrine 1/80000 and group 2 received Prilocaine 3%+ 0.03 IU/ml felypressin) anesthesia was administrated via inferior alveolar nerve block in 1.8 ml volume for providing anesthesia in the posterior of the mandible. Subjects who needed more then 1.8 ml of local anesthesiawere removed from the study. One glucometer was used for all measurements and an observer performed the blood glucose tests. All subjects signed a consent for measurement of blood glucose before and after the procedure. An examiner performed all measurements and a surgeon participated in the study.

Statistical analysis

Statistical analyses were performed using SPSS 19 for the PC (IBM, New York, NY). Independent T test was used to compare pre-extraction and post-extraction blood glucose level between two groups. Paired T test was applied to compare the blood glucose level before and after extraction in each group. Pearson correlation test was used to determine any correlation between age and the blood glucose level before and after extraction.

Results

We studied 60 subjects (27 males, 33 females) in two groups. The mean age of subjects was 34.56± 7.47 in group 1 and 36.03±5.67 in group 2. Analysis of the data did not show any difference for age between two groups. (P>0.05) Group 1 consisted of 13 males and 17 females and group 2 had 14 males and 16 females. (Table 1) Results did not demonstrate any difference between two groups for sex. (P>0.05). The mean of pre-extraction BGL was 93.46±16.30 mg/dl in group 1 and 96.53±16.69 mg /dl in the group2. The mean of BGL after extraction was 100.03±18.86 mg/dl in the group1 and 94.80±12.60 mg/dl in the group 2. Assessment of the data did not show any difference for pre and post-extraction BGL between two groups. (Table 2) Analysis of data using Paired T test did not show a significant difference between two pre extraction and post extraction blood glucose level in both groups. (P >0.05) (Table 3) Results did not show any correlation between age and BGL changes in both groups. (P>0.05)(Table 4) Comparison of BGL between males and females did not demonstrated any significant differences in both groups. (P>0.05)

Discussion:

Vasoconstrictors are added to the local anesthesia drugs for increase of anesthesia duration and also decrease of bleeding during oral surgeries. One of the main concerns of these drugs is systemic effects .It is well known that vasoconstrictors reduce toxicity of local anesthesia by decrease of resorption rate. [7] It has been suggested that vasoconstrictors can help an effective anesthesia and reduce stress induced endegeneous catecholamine release. Consequently, a total catecholamine is lower than plain anesthesia drugs. On the other hand, dental anesthetics with standard concentrations of Epinephrine seem to alter HR and BP. Although no cardiac ischemic alterations or any other cardiovascular complications have been observed. [8] A study demonstrated the patients' anxiety statuses neither varied significantly nor showed any correlation with the studied hemodynamic parameters and glucose levels, regardless of whether local anesthetics were used. [9]

Because patients experience adrenergic stimulation under both sets of circumstances (with and without vasoconstrictor), it is unclear why their hemodynamic and glucose parameters did not change significantly. With regard to adrenaline (also called epinephrine) and adrenergic system stimulation, it might be that adrenaline has both beta 1 and beta 2 activity. Beta 1 stimulation tends to cause an increase in blood pressure, whereas beta 2 stimulation tends to decrease blood pressure; therefore, it often does not dynamically increase blood pressure due, in part, to beta 2 activity. A second possible explanation is that the hemodynamic alterations are usually short in plasma due to the short adrenaline half-life, which is approximately less than three minutes. In addition, when stimulated, the sympathetic nervous system primarily releases norepinephrine and secondarily releases epinephrine. The effects of both substances on blood pressure have been described as limited.[10, 11]

In the present study, results did not demonstrate a significant change of the BGL in two groups. It seems using a carpule local anesthesia with epinephrine or felypressin did not change BGL. It could be hypothesized that the amount of vasoconstrictors was too much to affect BGL. Meechan

studied the effects of dental local anaesthetics on blood glucose concentration in healthy volunteers and in patients having third molar surgery. Results demonstrated a significant change of blood glucose level after administration of lidocaine with epinephrine.[12] Some studies suggested dental local anaesthetic solution containing epinephrine is safe to use in all healthy and diabetic patients (irrespective of their gender), excepting those diabetics who have not taken their pre-operative hypoglycaemic medication. There is no relation between the post-extraction glucose changes and the number of carpules used, number of teeth extracted or gender.[13, 14] When the metabolic effects of epinephrine containing and epinephrine-free local anesthetics were investigated in unsedated patients having third molar surgery, differences between treatments were found in the changes from baseline plasma potassium and blood glucose concentrations.[15]

Studies have shown that the amounts of epinephrine contained in one to three cartridges of local anaesthetic (0.018 to 0.054mg) may be enough to significantly increase the risk of a complications like ketoacidosis in patients with unstable diabetes, and so should be avoided until their condition is brought under glycaemic control. [16] Using improved methods for measuring catecholamines, a number of investigators have shown that epinephrine injected during dental local anaesthesia markedly elevates the resting plasma concentration of the hormone.[17] A meta-analysis of several studies using similar designs revealed that the mean resting venous plasma concentration of epinephrine is approximately doubled by the intraoral injection of a single cartridge of 2% lidocaine with 1:100,000 epinephrine, i.e. 18pg epinephrine.[18, 19]

Conclusion

It seems exogenous epinephrine or felypressin may not affect blood glucose level after the simple tooth extraction. However, using local anesthesia with a higher volume of vasoconstrictors could be administrated cautiously.

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