



## **Comparison between Articaine and Lidocaine Local Anesthetics on Blood Pressure and Heart Rate**

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**Introduction:** Articaine (Septocaine) is a relatively newly developed amide based local anesthetic drug. It is given in a 4% solution, whereas Lidocaine (Xylocaine) is given in concentration of 2%. Few studies examined the effect of those two local anesthetics on blood pressure and heart rate.

**Objective:** The objective of this study was to compare the effect of two different type of local anesthetics (Articaine and Lidocaine) on blood pressure and heart rate in ASA I patients (A normal healthy patient).

**Methods:** Adult patients receiving treatment at King Abdulaziz University Faculty of Dentistry (KAUFD) were recruited. The study design was double-blinded and patients received either Articaine with epinephrine 4% (1:100,000) or Lidocaine with epinephrine 2% (1:100,000) using infiltration technique. Vital signs including blood pressure and heart rate were measured at baseline, immediately, and 5 minutes after infiltration.



**Results:** The total sample size was 90 subjects, females constituted the majority (59%), their ages ranged between 19 and 30 years (52.2%), 31 and 40 years (37.8%), and 46-60 years (10%). There was no significant baseline difference between the two local anesthesia groups in systolic blood pressure and pulse rate, however, significant difference was observed with the diastolic blood pressure both. Moreover, differences in systolic (6 mmHg) and diastolic blood pressure (7 mmHg) was significantly lower in Lidocaine group compared to Articaine group at 5 minutes after injection.

**Discussion ;** Contrary to our study, Chaudhry *et al.* found there was a decrease in the systolic blood pressure and increase in heart rate at 5 minutes after injection, but in hypertensive patients (2). Another study on cardiac ischemic patients found increase in the systolic and diastolic blood pressure and heart rate after treatments (3). A limitation of the study is the small sample size. A strength of this study is the double-blinded study design.

**Conclusion:** Our study results suggest that there might be differences between Articaine and Lidocaine in the effect on blood pressure among ASA I patients. Further studies are needed especially to compare ASA I with medically compromised patients.

**Keywords:** Articaine, Lidocaine, heart rate, blood pressure



## **Introduction**

As of now, lidocaine and articaine are the two most ordinarily utilized sedatives in dental treatment. Lidocaine turned into the primary showcased nearby amide soporific in 1948, and is currently the most generally utilized local analgesic in numerous countries [1]. As the "highest quality level" for local anesthesia in dental treatment [2], lidocaine is frequently utilized in Inferior Alveolar Nerve Blocks (IANB). In the year of Articaine was presented clinically [3] and it is utilized generally till today. Because of its high liposolubility intervened by thiophene ring, articaine is invited by clinicians. Be that as it may, in clinical practice, Articaine Infiltration (AI) infusion is seldom utilized amid lower third molars extraction, since high thickness of the mandible blocks its diffusion [4].

## **Literature Review**

Local soporifics, for example, lidocaine and articaine are for the most part utilized with a vasoconstrictor to postpone the fundamental assimilation of the sedative, in this manner drawing out its activity and the force of the blockage [5]. Vasoconstrictors can cause hemodynamic changes amid the careful extraction of molars, like different variables, for example, the patient's uneasiness or feelings of anxiety [6]. Despite the fact that the security of utilizing a local sedative together with a vasoconstrictor has been affirmed in the writing [7, 8], noteworthy irregularities have been recorded in the circulatory strain and pulse of patients submitted to the extraction of third molars [1, 9].



Articaine has various pharmacological points of interest over other local sedatives, for example, the substitution of the fragrant ring by a thiophene ring, which builds liposolubility and power. The clinical points of interest of articaine incorporate the long term of its analgesic effect. It is just bettered by ultra-long analgesics, for example, bupivacaine, etidocaine and ropivacaine, which show more prominent dispersion through the bone tissue [10-12].

Lidocaine is the most usually utilized analgesic to control torment because of its more prominent pharmacokinetic qualities and low danger, when contrasted and other ester sedatives, which make it safe to use in clinical dentistry hone [13]. Both lidocaine and articaine have a similar maximum dose (500 mg) for grown-up patients (suggested dosage: 6.6-7.0 mg/kg) [10].

Hypertension is characterized as systolic and diastolic blood pressure more noteworthy than 140 and 90 mmHg, separately [14]. People accepting antihypertensive medicines are additionally called hypertensive regardless of whether they have controlled circulatory functions or not [15].

Uzeda inspected systolic and diastolic blood pressure changes in both patients with controlled and healthy blood pressure showing for dental extraction and accepting the administrations of local anesthetics with vasoconstrictors. The patients were inspected in the holding up room, when going into the medical procedure room and ten minutes after



the infusion. Systolic circulatory blood pressure was observed to be bring down in the patients who do not have circulatory problems than those with controlled pulse amid all the time focuses. Diastolic pulse, notwithstanding, was bring down in the healthy patients than those with controlled circulatory strain just amid the period in the holding up room [16].

De Morias analyzed the impact of lidocaine and articaine as sedatives on systolic and diastolic circulatory strain in patients with controlled pulse previously, immediately after administartion and five minutes after infusion and saw that the sort of soporifics utilized has no consequences for systolic and diastolic blood pressure [17, 18].

Various examinations [3, 13, 19-24] have assessed articaine and have reasoned that it is sheltered when utilized in proper doses. Both lidocaine and articaine have a similar most extreme milligram dosage of 500 mg (suggested doses of 6.6—7.0 mg/kg) for the sound grown-up patient. Because articaine is promoted as a 4% arrangement, the most extreme maker's prescribed doses for a sound 70-kg grown-up would be somewhat under 7 cartridges of an articaine arrangement contrasted and 13 h cartridges of a 2% lidocaine arrangement [25].

Articaine, as prilocaine, can possibly cause methemoglobinemia and neuropathies [3]. Although the rate of methemoglobinemia is uncommon, dental practitioners ought to know about this confusion in patients who are at an expanded danger of building up this



condition [26]. Haas and Lennon [27] and Miller and Haas [28] explored the rate of local analgesic actuated neuropathies. The rate of neuropathies (which included the lip as well as tongue) related with articaine and prilocaine was around 5 times that found with either lidocaine or mepivacaine [28]. Malamed et al [19] found, in an aggregate of 1325 patients, that the occurrence of paresthesia was the equivalent for articaine (1%) with respect to lidocaine (1%). In all cases, the paresthesias settled. In the Haas and Lennon review ponder [27], the occurrence of paresthesia was just 14 cases out of 11 million infusions, or roughly 1 of every 785,000 infusions. Subsequently, in spite of the fact that the rate of paresthesia is higher for articaine and prilocaine, it is as yet a clinically uncommon occasion.

The intraligamentary infusion (periodontal tendon infusion) permits arrangement of a local soporific arrangement specifically into the cancellous bone contiguous the tooth to be anesthetized [29]. Traditionally, intraligamentary infusions have been managed with a regular syringe or high-dose syringe [2, 29-44]. The Wand Plus (CompuDent, Milestone Scientific, Deerfield, Ill) nearby anesthesia framework was produced to convey a controlled measure of analgesic arrangement at an exact and ceaseless stream rate. The Wand Plus has been supported for penetration infusions, nerve square infusions, and intraligamentary infusions [45].

Intraligamentary infusion torment and postinjection torment has been accounted for utilizing regular and high-weight syringes. One study [46] has recorded intraligamentary



infusion torment utilizing a PC controlled nearby soporific conveyance framework in youngsters. Furthermore, aralticaine has not been contrasted and lidocaine in intraligamentary infusions in regards to infusion and postinjection torment. Smith and Pashley [47] discovered intraligamentary infusions of epinephrine-containing arrangements, utilizing a high-weight syringe in pooches, caused cardiovascular reactions like an intravenous infusion. Cannell et al, [48] utilizing a high-dose syringe in human volunteers, found that the intraligamentary infusions of epinephrine-containing soporific arrangements did not fundamentally change pulse, mood, adequacy, or circulatory strain.

The aim of this study was to compare between Articane and Lidocaine in terms of the effect on blood pressure and heart rate in ASA I patients (A normal healthy patient).



## **Materials & Methods**

This study was double-blinded clinical trial and patients received either Articaine with epinephrine 4% (1:100,000) or Lidocaine with epinephrine 2% (1:100,000) using infiltration technique prior to dental procedure. It was done on adult patients receiving treatment at King Abdulaziz University Faculty of Dentistry (KAUFD) were recruited. Vital signs including blood pressure and heart rate were measured at baseline (T1), immediately after (T2), and 5 minutes (T3) after infiltration

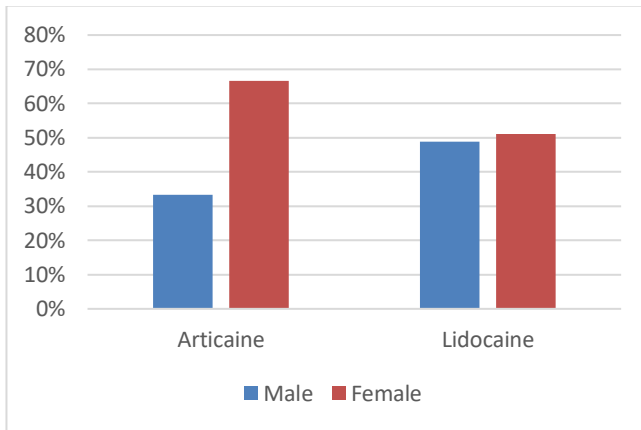
Ethical approval was received prior to the start of the study. Proper consent was obtained from patients.

Statistical analyses were performed using SPSS version 23 and all tests were performed at 0.05 level of significance. Statistical tests performed were Chi-square or Fissure Exact Test, as appropriate, and T-Test.

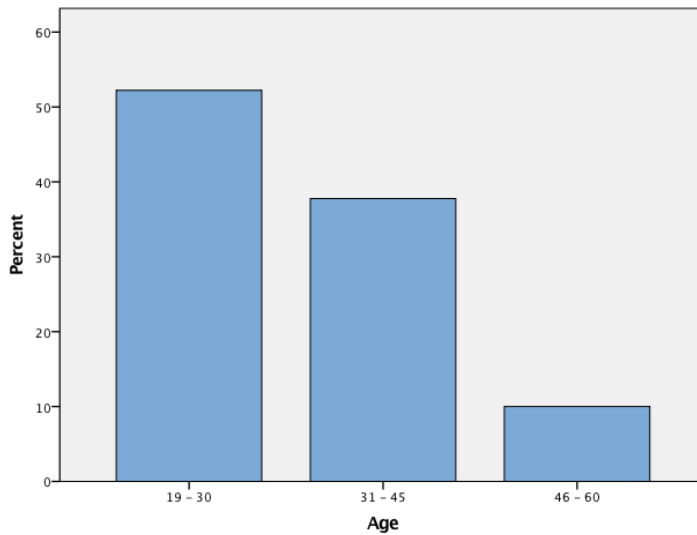
## **Results**

- The total sample size was 90 in which 59% were female. **(Figure 1)**
- Age: Majority (52.2%) were between 19 and 30 years, 37.8% were between 31 and 40 years, and 10% between 46-60 years. **(Figure 2)**





**Figure 1.** Gender distribution between the 2 treatment groups



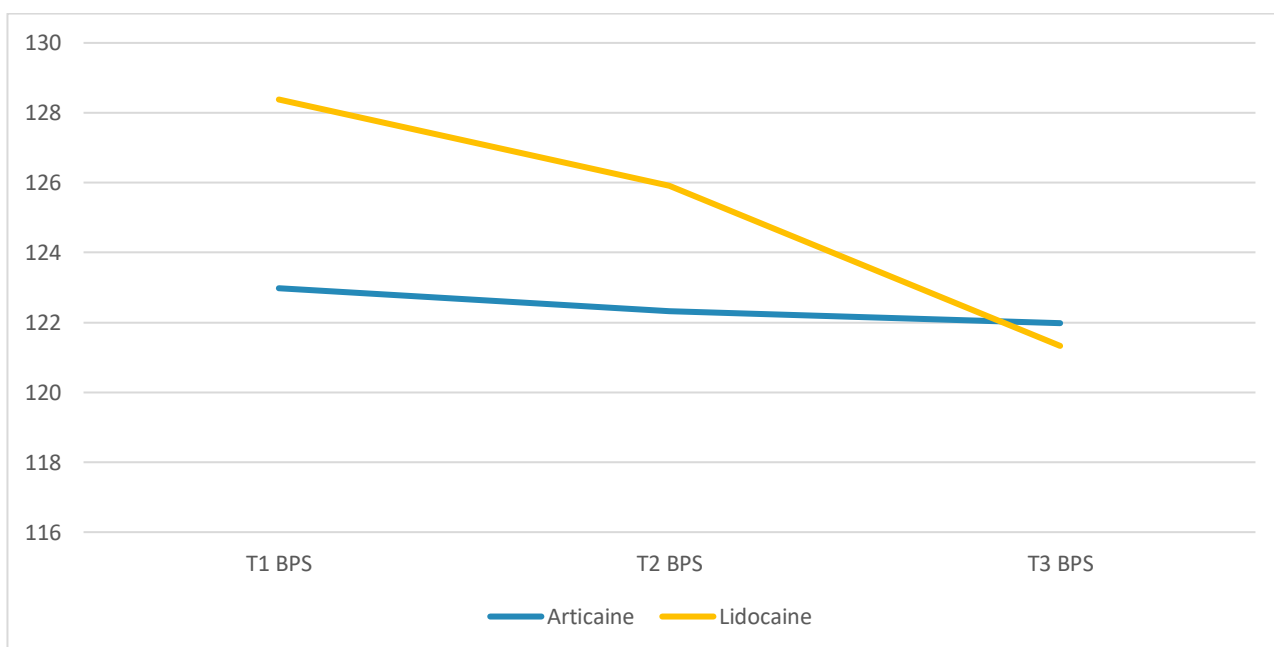
**Figure 2.** Age distribution of the study sample.

There was no significant baseline differences between the two local anesthesia groups in age, gender, systolic blood pressure and pulse rate. However, Articaïne group had 5.2 lower diastolic blood pressure than Lidocaine group ( $p=0.002$ ).



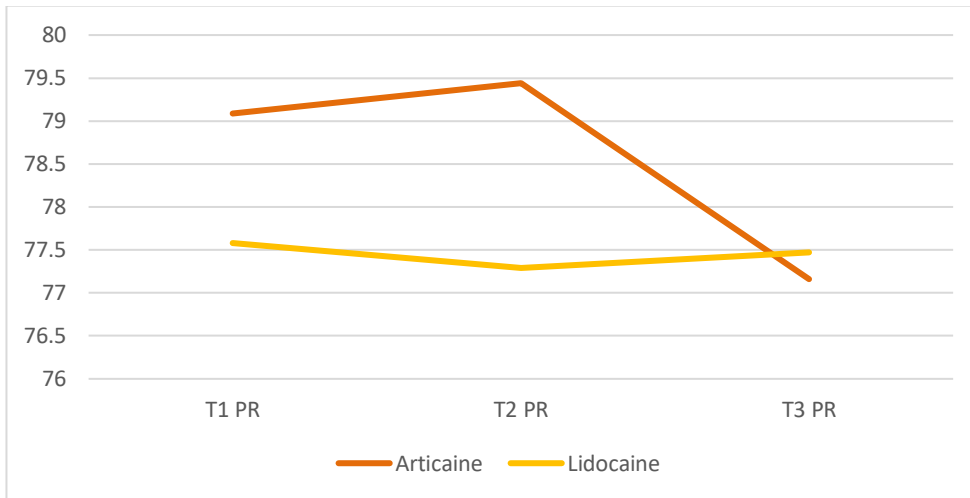
Systolic Blood Pressure: The only significant difference between the two groups was in T3-T1 ( $p=0.02$ ). (**Figure 3**)

- Diastolic Blood Pressure: There was significant difference between the two groups was in all time points. (**Figure 4**)
- Heart Rate: No significant difference between the two groups in all time points. (**Figure 5**)



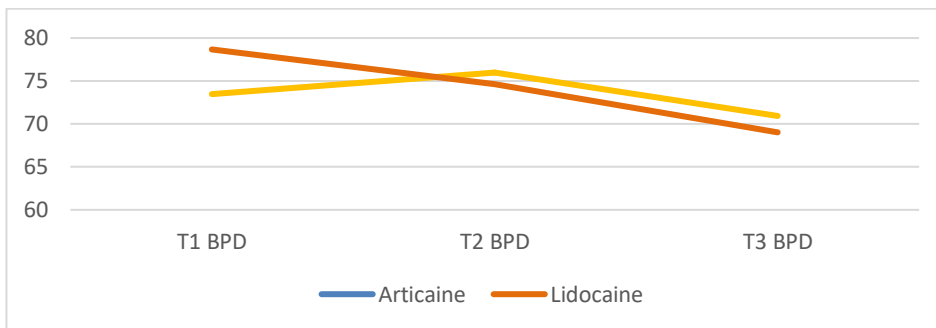
**Figure 3.** Systolic blood pressure for Articaïne and Lidocaine groups at baseline (T1), immediately after injection (T2), and 5 minutes after injection (T3).

\* indicate  $P < 0.05$



**Figure 4.** Systolic blood pressure for Articaïne and Lidocaine groups at T1, T2 and T3.

\* indicate  $P < 0.05$



**Figure 5.** Heart Rate for Articaïne and Lidocaine groups at T1, T2 and T3.

## Discussion

Contrary to our study, Chaudhry *et al.* found there was a decrease in the systolic blood pressure and increase in heart rate at 5 minutes after injection, but in hypertensive



patients [49]. Another study on cardiac ischemic patients found increase in the systolic and diastolic blood pressure and heart rate after treatments [50].

Small sample size is considered one of the limitations of the study, while double-blindness in study design is considered a strength point.

### **Conclusion**

Our study suggests that there might be differences between Articaine and Lidocaine in the effect on blood pressure among ASA I patients. Further studies are needed specially to compare the differences in ASA I with medically compromised patients.



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