

## Comparison Of 4% Articaine Infiltration And 2% Lignocaine during IANB in Children

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### ABSTRACT

**INTRODUCTION :** Pain control is an important aspect in reducing stress, fear and anxiety in the arena of dentistry which requires special care and attention especially in paediatric patients. Lidocaine is the gold standard anaesthetic solution and is considered to be the most effective anaesthetic agent. Articaine introduced in 1976 has been widely used because of its enhanced efficacy and safety factors.

**AIM:** The aim of the study is to compare 4% Articaine as infiltration and 2% Lignocaine as IANB in children

**MATERIALS AND METHOD:** The study was conducted as randomised single blinded trial comparing the efficiency of 4% Articaine and 2% lignocaine in children of age ranging from 5-13 years visiting Saveetha Dental College. After obtaining the informed consent of the parents, the 110 subjects were divided into 2 groups.Group 1 constituted 4% articaine group, while 2% lignocaine group.The treatment was performed on the same day and the onset of anaesthesia, pain during the procedure, the lingual diffusion and duration of anesthesia was evaluated.Behaviour modified scale and visual analogue scale was used for evaluation. The results were tabulated and statistically analysed.

**RESULTS:** The anaesthetic effect of lignocaine IAN block lasted more than that of articaine which was found to be statistically not significant. The lingual diffusion of

the tested anaesthetic solutions was statically significant with a p value < 0.005 and lignocaine found to produce better diffusion than articaine.

CONCLUSION: The anaesthetic efficiency of the two local anaesthetic agents were similar with a tendency of lignocaine to have increased duration of action.

### **INTRODUCTION:**

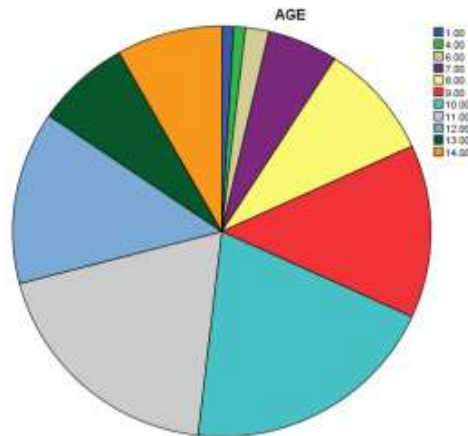
Pain control is significantly an important aspect in reducing stress, fear and anxiety related to the dental procedures in the arena of dentistry which requires special care and attention especially in paediatric patients. Local anaesthetics have a great impact on control of pain in dentistry and serves as a very potential tool in diminishing the pain.(1) 2% Lignocaine is the gold standard and considered to be the most effective anaesthetic agent that has been widely used for inferior alveolar nerve block administration in both paediatric as well as in adult patients in clinical practice(2). Clinical studies has shown that approximately 40-60% of these anaesthetics results in failure of IAN blocks in patients with irreversible pulpitis which has increased the necessity for supplementary injections such as Intrapulpal, Buccal infiltrations etc.(3,4,5) Recent advancements in anaesthetics has discovered new drugs such as Articaine which has been reported to be equally available and effective as that of lignocaine. Articaine was introduced in clinical practice in 1976 and has been widely used because of its enhanced efficacy and safety factors.(6) The articaine molecules consist of thiophene ring along with the ester group instead of benzene ring which makes it different from other anaesthetic solutions. This results in molecule which is more lipid soluble and therefore enables to easily cross lipid barriers, for example the nerve membrane.(7,8) Articaine, due to its increased diffusion, enables it produce profuse pulpal as well as palatal anaesthesia after buccal infiltrations thus enabling the clinicians to avoid painful nerve block specially in children. Studies have been done to compare the Articaine 4 % with adrenaline 1:100 000 with lignocaine 2 % with adrenaline 1:100 000 which proved articaine is safer and more effective local anaesthetic for use in paediatric dentistry. Although Articaine has been more frequently used in adult than in paediatric patients, it theoretically proven that it shows high efficacy and safety more in children than adults.(10) Hence, the present study was done to evaluate the efficacy of 4% articaine buccal infiltration as compared to 2% lignocaine IAN block in children with irreversible pulpitis.

**METHODS AND MATERIALS:**

The study was a randomised control study which was conducted in Saveetha Dental College for a period of three months between March 2016 to May 2016. The study was done on 110 paediatric patients who accepted to participate in the study and the informed consent was obtained from their parents. This study was done in order to compare the efficiency of 4% Articaine as infiltration over 2% Lignocaine as nerve block. The patients were randomly segregated into two groups of which the first group was administered with 4% Articaine as infiltration while the second group was administered with 2% lignocaine as nerve block. The inclusion criteria was patients with deep dental caries, moderate to severe pain with positive response to Electric Pulp Tester. Patients with allergies to local anaesthetics, history of any medical conditions and allergies, medications and presence of abscess were excluded from the study as these conditions may mask the effect of the local anaesthetics. paediatric Patients undergoing dental treatments such as extraction , pulp therapy where administered with local anaesthetics. About 1.8 - 2.0 mL of Articaine with 1:100,000 adrenaline was injected in subjects under the first group while 1.8-2ml of 2% lignocaine with 1:100,00 adrenaline in second group. The investigator evaluated the onset of anaesthesia, pain during the Local anaesthetic administration and during the treatment by several factors such as Facial expressions, arm/leg movement and crying were used to assess the child's pain during the injection and procedure and recorded the observations. A visual analog scale was given to the child after the procedure to indicate the presence or absence of pain and observations was recorded. The recorded data was analysed by statistical package for social sciences (SPSS) version 20 and the results are tabulated

**RESULTS AND DISCUSSION:**

The results of the study was recorded and analysed using SPSS software (version 20). About 110 children participated in the study out of which 49% were males while the rest 51% were females. The children participated in this study belonged to age group of 4-14 years with a mean age of 10 years.



The pain during the administration of anaesthesia was analysed and results were tabulated.

**LA type \* PAIN DURING LA ADMINISTRATION Crosstabulation**

Count		PAIN DURING LA ADMINISTRATION				Total
		no	mild	moderate	severe	
LA type	Lignocaine	10	20	21	4	55
	Articaine	6	34	14	1	55
Total		16	54	35	5	110

The pain during LA administration between articaine and lidocaine was found to be statistically significant (p value<0.005). when the pain levels for lidocaine was assessed it was reported that out of 55 people administered with local anaesthetics, about 10 children reported no pain , while 20 children reported of mild pain and 21 moderate pain and 4 reported severe pain.

When articaine was administered for another 55 children, about 6 children reported no pain , while 34 children reported of mild pain and 14 moderate pain and 1 with severe pain.

Whereas the pain during treatment between articaine and lidocaine was not statistically significant(p>0.005).

The lingual diffusion of the tested anaesthetic was statically significant in with p value<0.005

**LA type \* LINGUAL DIFFUSION Crosstabulation**

Count		LINGUAL DIFFUSION		Total
		yes	no	
LA type	Lignocaine	41	14	55
	Articaine	33	22	55
Total		74	36	110

Where when lignocaine was administered for about 41 out of 55 children, there was presence of lingual diffusion but when articaine was administered about 33 out of 55 children, lingual diffusion was observed.

**DISCUSSION:**

Many studies have compared the anaesthetic efficiency of articaine with other anaesthetic solutions. (11,12) In this study the time of onset of anaesthesia, the duration, depth of anaesthesia, and the pain experience after anaesthetic administration with 4% articaine with 1:100,000 adrenaline, and 2% lignocaine with 1:100,000 adrenaline were studied.

The Subjective evaluation of the local anesthetics used in this study was by means of a visual analog scale (VAS) in which the patient was instructed to score intraoperative pain intensity and pain during anesthetic administration

In this study, Articaine was found to have shorter duration of action as compared to Lignocaine which showed longer duration of action. This is in contrast to the study done by Ram and Amir [12] that showed articaine to produce longer soft tissue numbness as compared to lignocaine. But in our study articaine was used for infiltration unlike their study where articaine was used as an IAN block.

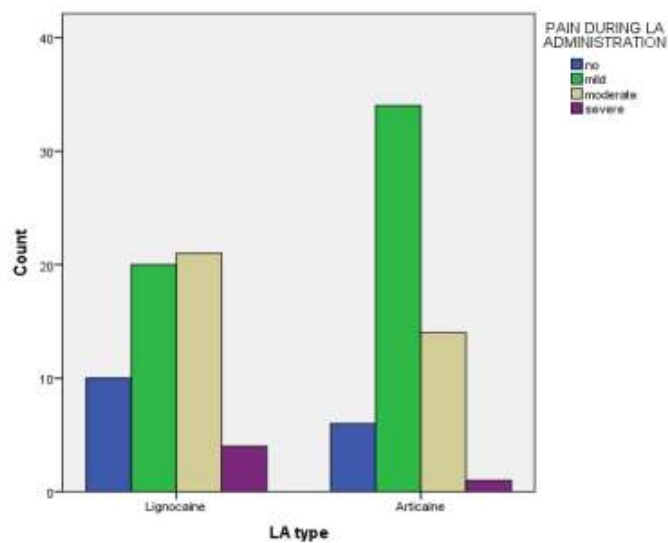
Buccal infiltration of articaine has shown to be effective in anesthetizing mandibular first molars teeth and studies also reported that articaine is more effective in infiltration than lidocaine [13,14].

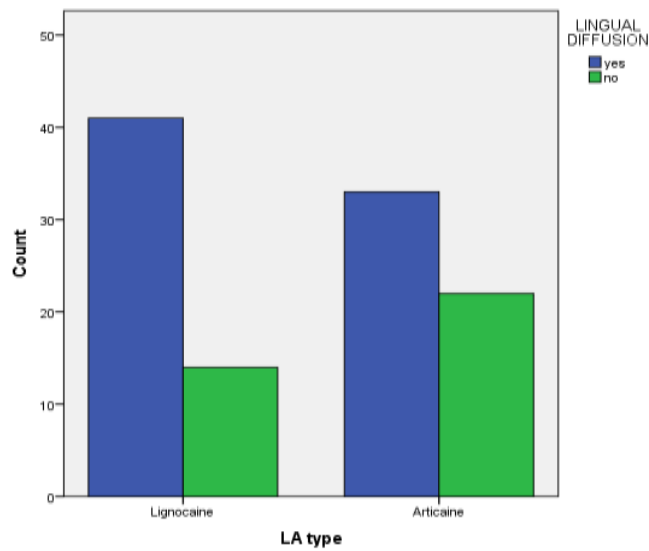
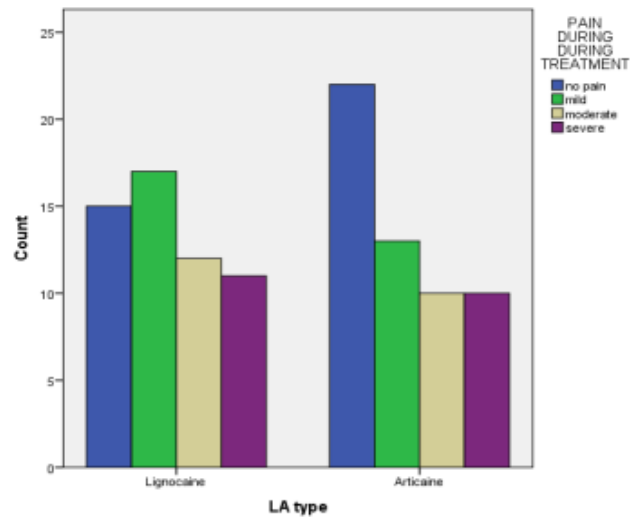
Costa *et al.*, in their study on 20 patients with maxillary posterior teeth infiltration, concluded that articaine produced shorter onset and longer duration of action when compared to lignocaine.

In the present study Lingual diffusion was found to be better with Lignocaine as compared to that of articaine that attributed to increased lipid solubility which helps in greater diffusion of anaesthetic solution in the tissues leading to faster action.

Previously studies clinically evaluated the efficiency of the two anesthetic solution by comparing the need for re-anaesthesia during the dental treatment. [16,17]

The duration of the effect of an anesthetic is proportional to its degree of protein binding. However, the duration of the effect of the local anesthetic is also dependent on the injection site or concentration of vasoconstrictor present in the anesthetic solution. Articaine presents one of the greatest protein binding percentages of all amide local anesthetics, comparable only to ultra-long action substances such as bupivacaine, ropivacaine and ethidocaine. This in turn implies a longer duration of the anesthetic effect. These values are comparable to those reported in the literature and are significantly longer than in the case of lidocaine. [18]





**CONCLUSION:**

In clinical practice Lignocaine was found to be safe and more efficient in diminishing pain than articaine and when lignocaine was administered lingual diffusion was observed more than that when articaine was administered.

Lignocaine is more effective and safer local anaesthetics than articaine in field of paediatric dentistry.

**REFERENCE**

1. Malamed SF, Gagnon S, Leblanc D. Articaine hydrochloride: a study of the safety [1] of a new amide local anaesthetic. *J Am Dent Assoc.* 2001;132:17785
2. Malamed SF. *Handbook of Local Anaesthesia*, 4th ed. St. Louis: Mosby-Year Book; 1997. pp. 63–64.
3. Claffey E, Reader A, Nusstein J, Beck M, Weaver J. Anaesthetic efficacy of articaine for inferior alveolar nerve blocks in patients with irreversible pulpitis. *J Endod.* 2004;30:568–71.
4. Kaufman E, Weinstein P, Milgrom P. Difficulties in achieving local anaesthesia. [4] *J Am Dent Assoc.* 1984;108:205.
5. Meechan JG. Supplementary routes to local anaesthesia. [5] *Int Endod J.* 2002;35:885–96.
6. Isen DA. Articaine: pharmacology and clinical use of a recently approved local anaesthetic. *Dent Today.* 2000;19:72-77.
7. Lipp M, Daublander M. The German experience of articaine. In: *Proceedings of the international symposium on local analgesia in dentistry*. London: Faculty of General Dental Practitioners, 1999. Pp. 21-22.
8. Oertel R, Ebert U, Rahn R, Kirch W. The effect of age on the pharmacokinetics of the local anesthetic drug articaine. *Regional Anesth Pain Med* 1999;24:524-528
9. Simon MA, Gielen MJ, Alberink N, Vree TB, van Egmond J. Intravenous regional anaesthesia with 0.5% articaine, 0.5% lidocaine, or 0.5% prilocaine. A double-blind randomized clinical study. *Reg Anesth.* 1997;22:29-34.
10. Progrei M A and Thamby S. Permanent nerve involvement resulting from inferior alveolar nerve blocks. *J Am Dent Assoc* 2000;131:901-907.
11. Meechan JG. A comparison of ropivacaine and lidocaine with epinephrine for [19] intraligamentary anaesthesia. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2002;93:469-73.
12. Ruprecht S, Knoll-Kohler E. Comparative study of equimolar solutions of lidocaine and articaine for anaesthesia. A randomized, double-blind cross-over study. *Schweiz Monatsschr Zahnmed.* 1991;101(10):1286-90.
13. Corbett IP, Kanaa MD, Whitworth JM, Meechan JG (2008) [Articaine infiltration for anesthesia of mandibular first molars. \*J Endod\* 34:514-518.](#)



14. Robertson D, Nusstein J, Reader A, Beck M, McCartney M (2007) [The anesthetic efficacy of articaine in buccal infiltration of mandibular posterior teeth. J Am Dent Assoc 138:1104-1112.](#)
15. Costa CG, Tortamano IP, Rocha RG, Francischone CE, Tortamano N. Onset and duration periods of articaine and lidocaine on maxillary infiltration. *Quintessence Int* 2005;36:197-201
16. Meechan JG, Blair GS. The effect of two different local anaesthetic solutions on pain experience following apicectomy. *Br Dent J.* 1993;175:410-13.
17. Raab WHM, Muller R, Muller HF. Comparative studies on the anaesthetic [22] efficiency of 2% and 4% articaine. *Quintessence.* 1990;41(7):1208-16.
18. Oertel R, Richter K. Plasma protein binding of the local anaesthetic drug articaine and its metabolite articainic acid. *Pharmazie* 998;53:646-647.
19. Dr. Lakshmi T and Rajeshkumar S “In Vitro Evaluation of Anticariogenic Activity of Acacia Catechu against Selected Microbes”, *International Research Journal of Multidisciplinary Science & Technology*, Vol. 3 , No. 3, 2018, pp.20-25.
20. Trishala A , Lakshmi T and Rajeshkumar S, “ Physicochemical profile of Acacia catechu bark extract –An In vitro study”, *International Research Journal of Multidisciplinary Science & Technology*, Vol.3 , No. 4, 2018, Pp. 26-30.

