



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

International Journal of Recent Scientific Research  
Vol. 8, Issue, 3, pp. 16061-16066, March, 2017

**International Journal of  
Recent Scientific  
Research**

DOI: 10.24327/IJRSR

## Research Article

### A COMPARATIVE EVALUATION OF THE EFFICACY OF 4% ARTICAIN (1:100000 ADRENALINE) AND 2% LIGNOCAINE (1:100000 ADRENALINE) IN SURGICAL EXTRACTION OF MANDIBULAR THIRD MOLARS

Nitin Sapra<sup>1</sup>, Simran Kaur Pawar\*<sup>1</sup>, Shruti Chhabra<sup>1</sup>, Parveen Sharma<sup>1</sup>,  
Salil Kawatra<sup>1</sup> and Harsimranjeet Singh Pawar<sup>2</sup>

<sup>1</sup>JN Kapoor DAV [C] Dental College, Yamunanagar Haryana, India

<sup>2</sup>UNT Health Science Centre, School of public Health Texas, USA

DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0803.0066>

#### ARTICLE INFO

##### Article History:

Received 16<sup>th</sup> December, 2016

Received in revised form 25<sup>th</sup>

January, 2017

Accepted 23<sup>rd</sup> February, 2017

Published online 28<sup>th</sup> March, 2017

##### Key Words:

Articaine; lignocaine;  
Impacted mandibular third molar.

#### ABSTRACT

**Background:** Adequate pain control has been a concern of dentists throughout the dental profession and of the patients they treat. The developments in pain control have enabled the selection and use of local anesthetic drugs based on the individual requirements of patients and the type of procedures. In the succeeding years, various amide local anesthetics has been introduced Since then; there has been a vast expansion in our knowledge about these drugs and techniques of administration. The present study shows a comparison of articaine and lignocaine as used in cases of surgical extraction of mandibular third molars.

**Aims:** To compare the anesthetic efficacy of 4% articaine with 1:100000 adrenaline versus 2% lignocaine with 1:100000 adrenaline with post-operative pain and adverse reactions associated with both the drugs in inferior alveolar nerve block during surgical extraction of impacted mandibular third molars.

**Methods and materials:** This was an *in vivo* study conducted in Oral and Maxillofacial Department of DAV Centenary Dental College. 131 patients were randomly selected arranged in group 1 and 2. Group 1 consisted of 66 patients receiving 4% articaine with 1:100000 adrenaline while Group 2 consisted of 65 patients receiving 2% lignocaine with 1:100000 adrenaline.

**Results:** It was found that the time taken to achieve the subjective onset of anesthesia, objective onset of soft and hard tissue anesthesia was comparatively shorter for 4% articaine with 1:100000 adrenaline than 2% lignocaine with 1:100000 adrenaline.

**Copyright © Nitin Sapra et al, 2017**, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

## INTRODUCTION

The pain of dental ills has been a constant tormentor since human beings arrived on Earth.(1) A revolutionary advancement of the late 1800s was the discovery of local anesthetics that facilitated pain prevention without the loss of consciousness.(2) In 1884 Koller an ophthalmologist, discovered that cocaine instilled into his conjunctival fornix produced localized insensitivity to touch and injury.(3) Modification of cocaine molecule has been responsible for producing a vast number of local anesthetics that have a definite relationship between their chemical structure and their local anesthetic properties.(4) In the 1940's a new group of local anesthetic compounds, the amides, were introduced. The initial amide local anesthetic, lignocaine, was synthesized by the Swede chemist Nils Lofgren in 1943.(2) Lignocaine is the

most popularly used local anesthetic in dentistry, and its pharmacodynamic features are the baseline in comparative studies with other local anesthetics. It is metabolized in the liver by microsomal oxidases to monoethyl glycine and xylidide and is excreted via the kidneys. The maximum recommended dose with the vasoconstrictor-containing solution is 7mg/kg of the body not to exceed 500mg. In the succeeding years, other amide local anesthetics such as prilocaine in 1953 by Lofgren and Tegner, bupivacaine and mepivacaine in 1957 by A. F. Ekenstam and etidocaine in 1971 by Takman were introduced. Articaine (originally named carticaine) was synthesized in Germany and then introduced for clinical use in Europe in 1976 (UltracaineR, Hoechst Pharmaceuticals) and Canada in 1982. (5) It was reported to have excellent diffusion capabilities, adequate duration (with the inclusion of a vasoconstrictor) and a very effective performance. A thiophene ring replaced the aniline ring on the

\*Corresponding author: **Simran Kaur Pawar**

JN Kapoor DAV [C] Dental College, Yamunanagar Haryana, India

lipophilic section of the molecule and, for the first time in local anesthetics, a sulfur atom was added within that thiophene structure.(6) The thiophene portion of the molecule gives articaine a high lipid solubility.(5,7,8) It is metabolized both in plasma by plasma esterase and in the liver by microsomal enzymes.

A number of studies have been done to compare the efficacy of articaine versus lignocaine in dental applications, and the results have shown a common trend for articaine hydrochloride to outperform the lignocaine hydrochloride. But very little has been known about the anesthetic efficacy of articaine and lignocaine during lower third molar surgery. Hence, the purpose of this current study was to present a comparison of articaine and lignocaine as used in cases of surgical extraction of mandibular third molars.

## METHODS

This study was initiated after ethical and research committee approval and was carried out over a period of 20 months. Patients willing to provide written consent, medically fit for the surgical procedures and having mandibular third molar were included. Patients allergic or hypersensitive to local anesthetics, medically compromised having bleeding problems, diabetes, immunocompromised status or osseous pathologies affecting the surgical outcome and wound healing and patients with the existence of swelling or acute infection at the time of surgery were excluded from the study.

This study was planned as follows:

- Selection of patient: It was a randomized, double-blind control trial in which the group of anesthetic solutions to be used had been randomly distributed. 131 patients were selected for surgical removal of impacted mandibular third molar under two distinct anesthetic solutions i.e. 4% Articaine with 1:100000 adrenaline and 2% Lignocaine with 1:100000 adrenaline
- A complete history of all the patients was taken along with the general physical and clinical examination and informed consent was signed by the patients.
- A patch test was done in the case of patients receiving the anesthetic solution for the first time to rule out any allergy to the anesthetic agent.

### Procedure

All patients were explained Heft Parker visual analog scale for evaluating intraoperative and postoperative pain. The injection site was prepared by painting the site with the antimicrobial solution. Classical direct inferior alveolar nerve block technique was used to anesthetize the inferior alveolar nerve and the lingual nerve. 1.8 ml of anesthetic solution was administered to block the inferior alveolar nerve and lingual nerve. Once the first signs of labial numbness appeared, the long buccal nerve was anesthetized by administering 0.5ml from the second syringe using a 24 gauge needle for the surgical extraction of impacted mandibular third molars. The surgical protocol included the following steps:

- Standard Ward's Incision
- Raising of buccal Mucoperiosteal Flap

- Bone removal using Moore-Gilby technique
- Tooth elevation
- Socket irrigation using 0.9% saline
- Wound closure using 3-0 silk suture

Patients were discharged with standard postoperative instructions which included firm pressure with sterile gauze pack for 30 minutes, to avoid rinsing, and to take the cold liquid and semi-solid diet for 24 hours. Antibiotics and analgesic were prescribed postoperatively. Patients were asked to rate the intra-operative pain on the visual analog scale at the time of incision, flap elevation, osteotomy and suturing and were also given a pre-structured performa to record the postoperative parameters.

### Parameters Evaluated

#### Intraoperative Parameters

Onset of anesthesia was calculated based on two types of observations

- Subjective evaluation: In this, the patient was asked for symptoms of tingling sensation and numbness on the ipsilateral side of the tongue and lower lip every 30 seconds after the administration of local anesthetic i.e. immediately after withdrawing the needle.
- Objective evaluation for soft tissue anesthesia and hard tissue anesthesia was done by using the following methods:
  - a. Needle Stick Test: A sterile 25 gauge needle was inserted into the mucosa around the mandibular first premolar at an angle of 45° till the tip contacts the bone. The patient was asked for any pain felt during the needle insertion. The absence of pain signified the onset of soft tissue anesthesia.
  - b. Test for the loss of proprioception: A probe was inserted into the periodontal ligament space between the two mandibular premolars of the same side and absence of pain determined the loss of proprioception.
  - c. Electric Pulp Test: Preoperatively baseline pulp sensitivity values were recorded before starting the procedure using a Parkell Gentle- Pulse™ Pulp Vitality Tester .It was graded in units from 0 – 10. This was done by applying a conductive jelly to the probe tip which was placed in the center of the buccal surface of the first premolar. The current was gradually increased till the patient felt pain. Values were then recorded.

After the soft tissue anesthesia had been achieved, pulp sensitivity testing of mandibular first premolar was carried out intraoperatively at every 30 seconds interval. The time when the patient reported no sensation on stimulation was taken as the onset of hard tissue anesthesia.

Duration of anesthesia - It was calculated from the time of onset of numbness and tingling post injection till the wearing away of anesthesia. The patient was given the performa in which he recorded the time of wearing away of anesthesia.

The depth of anesthesia - The depth of anesthesia was recorded intraoperatively using the Heft-Parker Visual Analogue Scale<sup>3</sup> during four different steps of the surgical procedure: Soft tissue incision, flap elevation, osteotomy, suturing.

**Heft-Parker visual analog scale (VAS)**

In this, a straight line 170mm long was drawn on a piece of paper which contained markings as shown in the following figure. The patients were asked about the pain which was graded as per this scale. (FIG 1)

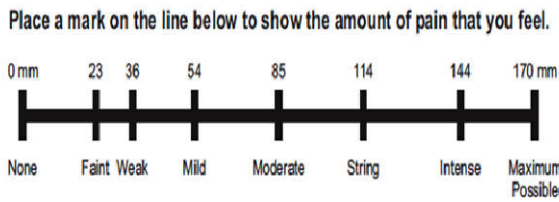


Figure 1 Heft Parker Visual Analog Scale (VAS)

The VAS was divided into four categories to measure pain:

- No pain corresponds to 0 mm
- Mild pain was defined as greater than 0 mm and less than or equal to 54 mm.
- Moderate pain was defined as greater than 54 mm and less than 114 mm.
- Severe pain was defined as equal to or greater than 114 mm.

**Postoperative Parameters**

Postoperatively the patient was evaluated at 8hrs, 16hrs and 24hrs based on the following parameters:

The intensity of postoperative pain was measured based on the Heft-Parker Visual Analogue Scale and categorized into:

- No pain: 0mm
- Mild pain: 0mm - 54mm
- Moderate pain: 54mm - 114mm
- Severe pain: > 114mm

Adverse reactions including excessive pain, nausea, vomiting, epigastric distress, etc. were classified based on their severity i.e.

- Severe: requiring continuous medical attention or loss of work.
- Moderate: requiring administration of additional medication.
- Mild: requiring no additional treatment.

**RESULTS**

66 out of the 131 patients were given 4% articaine with 1:100000 adrenaline (Group I) and 65 out of 131 patients were given 2% lignocaine with 1:100000 adrenaline (Group II). The difference between the mean age and gender distribution of both the groups was statistically non-significant.

Preoperative baseline pulp sensitivity was found to be 3 in 85 out of 131(64.89%) in both the groups (statistically non-significant).

The mean time of onset of subjective anesthesia for the group I was 73.89 seconds and for group II was 118.4 seconds, so the onset for group I was found to be shorter by about 45 seconds, and the difference was found to be significant.

Objective evaluation was also done to calculate and compare soft tissue and hard tissue anesthesia in the two groups. The difference between the mean time taken for objective onset of

soft tissue anesthesia by needle prick test with the group I (84.92 seconds) and group II( 130.62 seconds) was found to be 45.70 seconds with onset being shorter for the group I and this difference was found to be statistically significant. The mean time is taken for loss of proprioception with the group I was 99.59 ± 25.58 seconds as compared to 147.15 ± 27.10 seconds with group II. So, the mean time is taken for loss of proprioception in group I patients was 45 seconds less than that of group II patients (significant). (Figure 2 and Table 1) patients in group I achieving pulpal anesthesia earlier than those in group II. (statistically significant)

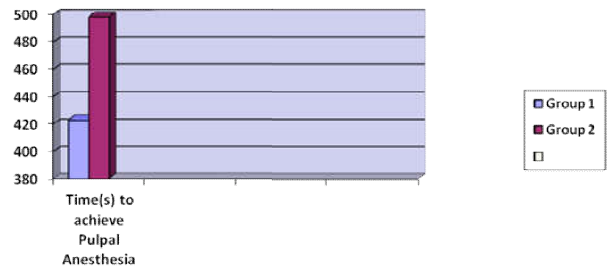


Figure 2 Objective evaluation was also done to calculate and compare soft tissue and hard tissue anesthesia in the two groups

Table 1 Time taken (in seconds) to achieve soft/hard tissue anaesthesia

SN	Landmark	Group I (n=66)		Group II (n=65)		Significance of difference	
		Mean	SD	Mean	SD	"t"	"p"
1.	Subjective onset	73.89	31.06	118.40	31.01	-8.21	<0.001
2.	Needle prick onset	84.92	23.15	130.62	27.32	-10.33	<0.001
3.	Loss of proprioception	99.59	25.58	147.15	27.10	-10.33	<0.001
4.	Electric pulp test	422.88	54.57	498.31	58.72	-7.617	<0.001

The efficacy of the two anesthetics was also compared on the basis of depth of the anesthesia between the two groups, which was inversely proportional to intra-operative pain measured with the help of Heft-Parker Visual Analogue Scale at the time of soft tissue incision, flap elevation, osteotomy and suturing.

In the present study, we observed that Heft-Parker VAS scores were found to be higher and statistically significant in patients with group II as compared to those of group I during all the steps of the surgical procedure. (Figure 3(A and B) & Table 2)

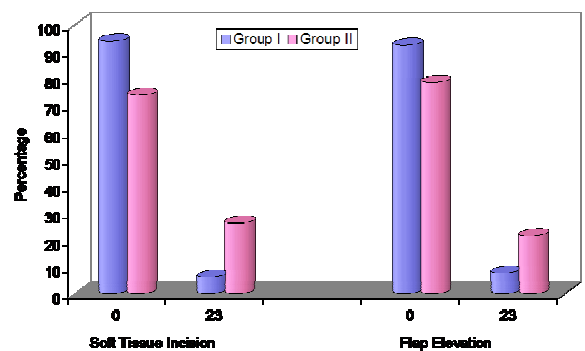


Figure 3 a

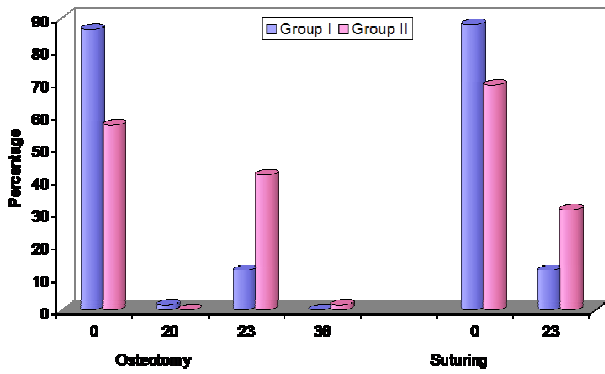


Figure 3 b

Figure 3(a and b) The efficacy of the two anesthetics was also compared on the basis of depth of the anesthesia between the two groups

Table 2 Intraoperative VAS Scores

SN	Variable	Group I (n=66)		Group II (n=65)		Significance of difference (Mann Whitney U test)		
		No.	%	No.	%	Z	"p"	
1.	Soft tissue incision	0	62	93.9	48	73.8	3.122	0.002
		23	4	6.1	17	26.2		
		23	4	6.1	17	26.2		
2.	Flap elevation	0	61	92.4	51	78.5	2.260	0.024
		23	5	7.6	14	21.5		
		23	5	7.6	14	21.5		
3.	Osteotomy	0	57	86.4	37	56.9	3.749	<0.001
		23	9	13.6	27	41.5		
		36	0	0.0	1	1.5		
		36	0	0.0	1	1.5		
4.	Suturing	0	58	87.9	45	69.2	2.593	0.010
		23	8	12.1	20	30.8		
		23	8	12.1	20	30.8		

The difference between the mean duration of anesthesia between the group I patients (5:16:28 hours) and those of group II (3:7:56 hours) patients was found to be approx 129 minutes with the group I having a longer duration than Group II by more than 2 hours. (Figure 4 and Table 3)

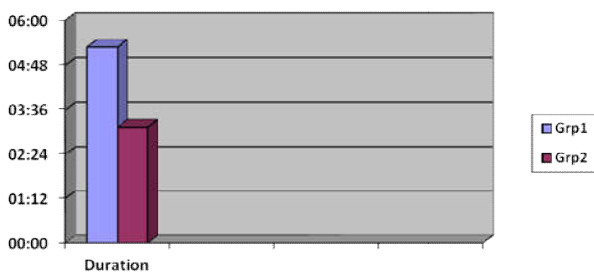


Figure 4 The difference was found to be statistically significant at all the time durations indicating greater post-operative pain in group II as compared to group I

Table 3 Duration of Anaesthesia (hh:mm:ss)

Landmark	Group I (n=66)		Group II (n=65)		Significance of difference	
	Mean	SD	Mean	SD	"t"	"p"
Duration	5:16:28	0:37:17	3:7:56	0:28:57	22.006	<0.001

Postoperative VAS score at all the time durations i.e. 8 hours, 16 hours and 24 hours was found to be higher in Group II as compared to Group I with a mean of 33.76 at 8 hours, 23.05 at 16 hours and 10.85 at 24 hours. The difference was found to be statistically significant at all the time durations indicating greater post-operative pain in group II as compared to group I. (Figure 5 and Table 4)

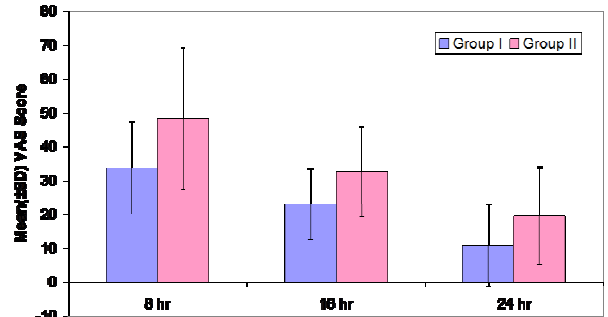


Figure 5

Table 4 Post-op. VAS Scores

SN	Time interval	Group I (n=66)		Group II (n=65)		Significance of difference (Mann Whitney U test)	
		Mean	SD	Mean	SD	"z"	"p"
1.	8 hr	33.76	13.66	48.23	21.09	4.370	<0.001
2.	16 hr	23.05	10.54	32.57	13.45	4.144	<0.001
3.	24 hr	10.85	12.18	19.54	14.49	3.434	<0.001

The majority of subjects of the study population (89.3%) were having mild adverse reactions in which no additional treatment or medications were required by the patient apart from the usual analgesics and antibiotics prescribed. Proportion of moderate adverse reactions was found to be higher in Group II (18.46%) as compared to Group I (3.03%), thereby requiring administration or intake of additional medications including more potent analgesics, antacids, antiemetics, etc. and proportional difference in adverse reactions observed in both the groups was found to be statistically significant. None of the groups reported a case of severe adverse reactions in which constant medical attention or hospital admission was required.

## DISCUSSION

Adequate pain control is an important factor for an atraumatic removal of impacted third molars with uneventful recovery which is usually done by the use of local anesthetics. Despite the "gold standard" status of lidocaine hydrochloride, which is the most commonly used local anesthetic in dental practice, many clinical trials have proven the efficacy of another amide local anesthetic, articaine, which differs from lidocaine in having a thiophene ring in its structure instead of the usual benzene ring. An enhanced action of articaine hydrochloride was claimed over other local anesthetics based on the molecule having more lipid soluble abilities across the nerve membrane.(9)

The shorter subjective onset time for the group I patients (articaine) is attributed to the presence of thiophene ring instead of the usual benzene ring molecule which imparts

greater lipid solubility to articaine as compared to lignocaine. Thereby, it penetrates the nerve membrane more easily and also due to a lower dissociation constant (pKa-7.8) of articaine which is comparable to lignocaine (pKa-7.9) which results in large number of lipophilic free base molecules that are able to diffuse through the nerve sheath thereby lowering the onset time (6,10,11). These characteristics also result in shorter time of onset of hard and soft tissue anaesthesia with articaine (12,13)

The present study coincided with the study of Sierra-Rebolledo A *et al* (14) who found the difference between the mean subjective onset between 4% articaine with 1:100000 adrenaline and 2% lignocaine with 1:100000 adrenaline to be 19 seconds with articaine having a shorter onset of anaesthesia. Martinez-Rodriguez N *et al.* (15) reported latency period of 1.04 min and 3.75 min respectively for Articaine and Lignocaine with the difference being more than 2 minutes with articaine having a shorter onset time.

The Heft Parker VAS scores during various steps in surgical extraction of mandibular third molars were found to be considerably lower in group I than in group II indicating a higher depth of anaesthesia in group I patients and this is the result of higher lipid solubility and a lower dissociation constant (pKa-7.8) of articaine which increases the diffusion of larger number of free base molecules through the nerve membrane and thereby increasing the potency of the drug. These results are comparable to those obtained in other studies by Malamed SF *et al.* (16) in which the pain ratings by using the visual analog scale for pediatric patients were less in the patients given articaine than those in which lidocaine was administered for simple and complex procedures.

Duration of anaesthesia is an important parameter which has been implicated in this comparison between the two groups for the removal of impacted third molars and articaine was found to have a significantly greater duration of action than lignocaine. Sierra-Rebolledo A. *et al.* (14) observed similar results confirming statistically that 4% articaine with 1:100000 epinephrine has a longer duration of action as compared to 2% Lignocaine with 1:100000 epinephrine.

The longer duration of articaine as compared to lignocaine is because articaine presents one of the greatest protein binding percentages of all amide local anaesthetics, comparable only to ultra-long-acting substances such as bupivacaine, ropivacaine, and etidocaine. Factors that affect both the depth and duration of anaesthesia, either prolonging or decreasing it, include individual response to the drug, accuracy in the deposition of local anaesthetic, the status of tissue at the site of drug application, anatomical landmarks variation and volume of anaesthetic solution used.

Articaine offers better post-operative analgesic effect clinically with a significant reduction in postoperative analgesic requirement. The reason could be due to pharmacodynamic factors specific to the anaesthetic (17) or the blockage of sensory input with a long-acting local anaesthetic reduces post-operative pain even after the anaesthetic effects have dissipated. In this study, postoperative pain at all the time durations i.e. 8 hours, 16 hours and 24 hours was found to be lesser with articaine.

## Statistical analysis method

### Analysis

- The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software.
- The values were represented in Number (%) and Mean $\pm$ SD.

## CONCLUSION

One of the most important factors for successful treatment is controlling patient's pain which is usually done by the use of local anaesthetics. In our study, it was observed that the time taken to achieve the subjective onset of anaesthesia was shorter for 4% articaine with 1:100000 adrenaline as compared to 2% lignocaine with 1:100000 adrenaline.

Time taken for achieving objective onset of soft and hard tissue anaesthesia which was checked with the help of needle prick test, loss of proprioception and electric pulp testing was comparatively shorter for 4% articaine with 1:100000 adrenaline than 2% lignocaine with 1:100000 adrenaline. The depth of anaesthesia of 4% Articaine with 1:100000 adrenaline was found to be higher than 2% Lignocaine with 1:100000 adrenaline by using the Heft-Parker VAS scores during various steps in surgical extraction of impacted lower third molars. 4% Articaine with 1:100000 adrenaline was found to have a longer duration of action than 2% Lignocaine with 1:100000 epinephrine, thus adding to the patient comfort after extraction by increasing painless duration. Articaine offers better post-operative analgesic effect clinically with a significant reduction in post-operative analgesic requirement as compared to Lignocaine thus increasing the patient comfort after surgical extraction and a faster recovery.

There was no need of any additional medications or continuous medical attention in the majority of the patients given 4% articaine showing that it is a safe local anaesthetic with a better postoperative analgesic effect. Research based on these pain control parameters is difficult to standardize, due to pain threshold of each patient, as well as the degree of difficulty of patients to understand the instructions of visual analog scale. It is suggested that more controlled clinical trials with a higher number of patients are essential to further substantiate the efficacy of the local anaesthetic.

Figure 2: Objective evaluation was also done to calculate and compare soft tissue and hard tissue anaesthesia in the two groups  
Figure 3 (a and b): The efficacy of the two anaesthetics was also compared on the basis of depth of the anaesthesia between the two groups

Figure 4: The difference was found to be statistically significant at all the time durations indicating greater post-operative pain in group II as compared to group I

Table 1: Time taken (in seconds) to achieve soft/hard tissue anaesthesia

Table 2: Intraoperative VAS Scores

Table 3: Duration of Anaesthesia (hh:mm:ss)

## References

1. Chitre A P. Manual of local anaesthesia in dentistry. *Jay Pee* 2006:3-11.

2. Malamed S F. Handbook of Local Anesthesia. 5<sup>th</sup> ed. Elsevier; 2007.
3. Koller C. Historical Notes on the beginning of local anesthesia. *JAMA* 1928; 90:1742-3.
4. Bennet C R. Monheim's local anesthesia and pain control in dental practice. Seventh edition, CBS; 1990:125-126.
5. Hawkins JM. Articaine: Truths, Myths, and potentials. *Acad Dent Ther Stomat*. ADA CERP 1-10, 2002.
6. Hawkins JM. A Peer-Reviewed Publication. Articaine: Efficacy and Paresthesia in Dental Local Anaesthesia. 2000.
7. Haas DA, Lennon D. A 21-year retrospective survey of reports of paresthesia following local anesthesia administration. *J Can Dent Assoc*. 1995; 61:319-30.
8. Malamed SF, Gagnon S, Leblanc D. Efficacy of articaine: a new local anesthetic. *J Am Dent Assoc*. 2000; 131:635-42.
9. Isen DA. Articaine: pharmacology and clinical use of a recently approved local anesthetic. *Dent Today* 2000; 19:72-77.
10. Malamed S F. Handbook of Local Anaesthesia. 5<sup>th</sup> ed. Elsevier; 2007. Hawkins JM. A Peer-Reviewed Publication. Articaine: Efficacy and Paresthesia in Dental Local Anaesthesia. 2000.
11. Snoeck M. Articaine: a review of its use for local and regional anesthesia. *Local and Regional Anaesthesia*. Dovepress Review. 2012.
12. Tortamano IP, Siviero M, Lee S, Sampaio RM, Simone JL, Rocha RG. Onset and Duration of Pulpal anesthesia of Articaine and Lidocaine in Inferior Alveolar Nerve block. *Braz Dent J* 2013; 24(4): 371-374.
13. Jung IY, Kim JH, Kim ES, Lee CY, Lee SJ. An Evaluation of Buccal Infiltration and Inferior Alveolar Nerve Blocks in Pulpal Anaesthesia For Mandibular First Molars. *JOE* 2008; 34(1): 11-13.
14. Rebolledo AS, Molina ED, Aytés LB, Escoda CG. Comparative study of the anesthetic efficacy of 4% articaine versus 2% lidocaine in inferior alveolar nerve block during surgical extraction of impacted lower third molars. *Med Oral Patol Oral Cir Bucal* 2007; 12:e139-44.
15. Rodríguez NM, Dorado CB, Arés MM, Brinkman JCB, González JMM. Evaluation of the anesthetic properties and tolerance of 1:100,000 articaine versus 1:100, 000 lidocaine. *Med Oral Patol Oral Cir Bucal*. 2012 Mar 1; 17 (2):e345-51.
16. Malamed SF, Leblanc D. A comparison between Articaine HCl and Lidocaine HCl in pediatric dental patients. *Pediatr Dent* 2000; 22: 307-311.
17. Trullenque-Eriksson A, Guisado-Moya B. Comparative study of two local anesthetics in the surgical extraction of mandibular third molars: Bupivacaine and Articaine. *Med Oral Patol Oral Cir Bical*. 2011 May 1 and 16(3):e390-6.

**How to cite this article:**

Nitin Sapra et al., 2017 A Comparative Evaluation of the Efficacy of 4% Articaine (1:100000 Adrenaline) and 2% Lignocaine (1:100000 Adrenaline) in Surgical Extraction of Mandibular Third Molars. *Int J Recent Sci Res*. 8(3), pp. 16061-16066.

\*\*\*\*\*