International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

A Comparative Evaluation of Lignocaine and Articaine Efficacy in Extractions

¹Dr. Simerpreet Kaur Bagga, ²Dr. Amrita Gill

¹Associate Dentist, Welness Plan Center, Detroit, USA; ²Associate Dentist, Khurana Dental Clinic, Amritsar, Punjab, India

ABSTRACT:

Aim- The aim of the study was to conduct a comparative evaluation of the efficacy of lignocaine and articaine in dental extractions, assessing key factors such as duration of anesthesia, pain control, and overall effectiveness of the two local anesthetics during the extraction procedure. Materials and methods- This prospective comparative study aimed to evaluate the efficacy of lignocaine and articaine as local anesthetics in bilateral extractions over three months. Ethical approval and informed consent were obtained before enrolling 40 participants aged 18-40 years, classified as ASA-I and cooperative. Exclusion criteria included medically compromised patients, pregnant females, smokers, alcoholics, individuals with anxiety, allergies to anesthetic medication, or inflammation at the injection site. The extraction sites were randomized to receive either articaine or lignocaine, with cartridges masked to maintain a double-blind setup. Data analysis was done using SSPS software. Results- Our study included 40 participants, with 18 males and 22 females. Among males, 8 were aged 18-30 years, and 10 were aged 31-40 years. For females, 10 were in the 18-30 years age group, while 12 were in the 31-40 years group. Group 1 received lignocaine anesthesia, while Group 2 was administered articaine anesthesia. The study assessed two parameters: the duration of action and pain score. For the duration of action, Group 1 had a mean of 127.8 minutes (SD = 5.731), while Group 2 had a mean of 189.2 minutes (SD = 3.626), with a significant difference (P = 0.002). Regarding pain score, Group 1 had a mean score of 1.26 (SD = 0.425), and Group 2 had a mean score of 0.98 (SD = 0.160), also showing a significant difference (P = 0.002). Conclusion- The study found that articaine provided a longer duration of action and better pain control than lignocaine, leading to a more comfortable and pain-free experience for patients undergoing extractions. Keywords- articaine, lignocaine, anesthesia

Received Date: 25 July, 2024

Acceptance Date: 29 August, 2024

Corresponding author: Dr. Simerpreet Kaur Bagga, Associate Dentist, Welness Plan Center, Detroit, USA

This article may be cited as: Bagga SK, Gill A. A Comparative Evaluation of Lignocaine and Articaine Efficacy in Extractions. Int J Res Health Allied Sci 2024; 10(5):122-124.

INTRODUCTION

Local anesthetics block peripheral nerves to prevent pain and provide motor blockade during surgeries, dental procedures, labor, and chronic pain management. First introduced with cocaine in 1886, ester-type anesthetics like procaine were succeeded by amide-type anesthetics for improved onset and reduced allergenicity, beginning with lignocaine (lidocaine), synthesized in 1943 and marketed in $1949.^{1,2}$ Other amide anesthetics, such as mepivacaine, prilocaine, and bupivacaine, have also become widely used over time. Articaine, originally synthesized as carticaine in 1973, is now a staple in dentistry and is commonly used worldwide as a 4% solution with adrenaline. Unlike other amides, articaine features a thiophene ring, which improves lipid solubility and facilitates diffusion across nerve

membranes. Additionally, its ester group allows it to be metabolized by plasma cholinesterases and excreted primarily through the kidneys.^{3,4}

Lignocaine is widely used both as a local anesthetic and as an antiarrhythmic drug, but its administration is not without risks, as adverse effects can occur. ^{5,6} In the context of acute myocardial infarction (AMI), lignocaine is primarily used to prevent ventricular fibrillation. Initially recommended for use after the appearance of "warning arrhythmias," recent evidence questions the reliability of these warning signs. Prophylactic lignocaine administration for all coronary care unit patients, irrespective of arrhythmic warnings, has shown mixed results, with some studies reporting efficacy while others do not.^{7,8} The success of prophylactic therapy appears dose-dependent, with higher doses potentially improving outcomes. However, the lack of a clear clinical endpoint, coupled with the need to treat many patients to benefit a few, makes its routine prophylactic use controversial.

The aim of the study was to conduct a comparative evaluation of the efficacy of lignocaine and articaine in dental extractions, assessing key factors such as duration of anesthesia, pain control, and overall effectiveness of the two local anesthetics during the extraction procedure.

MATERIALS AND METHODS

This prospective comparative study aimed to evaluate the efficacy of lignocaine and articaine as local anesthetics in bilateral extractions. Ethical approval and informed consent were obtained before enrolling 40 participants aged 18-40 years, classified as ASA-I and cooperative. Exclusion criteria included medically compromised patients, pregnant females, smokers, alcoholics, individuals with anxiety, allergies to anesthetic medication, or inflammation at the injection site. The extraction sites were randomized to receive either articaine or lignocaine, with cartridges masked to maintain a double-blind setup.

Participants underwent bilateral extractions with one site receiving lignocaine and the other articaine. Pulpal anesthesia onset and duration were assessed using electric pulp testing and patient-reported outcomes, while pain was evaluated via a 5-point visual analog scale. Data analysis was done using SSPS software.

RESULTS

Table 1:	Demographic	characteristics	of the	participants

ceteristics of the participants.							
Gender	18-30 years	31-40 years	Total				
Male	8	10	18				
Female	10	12	22				
Total	18	22	40				

The study included 40 participants, with 18 males and 22 females. Among males, 8 were aged 18-30 years, and 10 were aged 31-40 years. For females, 10 were in the 18-30 years age group, while 12 were in the 31-40 years group.

 Table 2: Comparison of Results between the Two Study Groups.

 Group 1 received lignocaine anesthesia, while Group 2 was administered articaine anesthesia anesthesia.

Parameter	Groups	Number	Mean	SD	P value
Duration of action	1	40	127.8	5.731	0.002*
	2	40	189.2	3.626	
Pain score	1	40	1.26	0.425	0.002*
	2	40	0.98	0160	

Group 1 received lignocaine anesthesia, while Group 2 was administered articaine anesthesia. The study assessed two parameters: the duration of action and pain score. For the duration of action, Group 1 had a mean of 127.8 minutes (SD = 5.731), while Group 2 had a mean of 189.2 minutes (SD = 3.626), with a significant difference (P = 0.002). Regarding pain score, Group 1 had a mean score of 1.26 (SD = 0.425), and Group 2 had a mean score of 0.98 (SD = 0.160), also showing a significant difference (P = 0.002).

DISCUSSION

A comparative evaluation of lignocaine and articaine efficacy in extractions aims to assess and compare the effectiveness of these two commonly used local anesthetics in dental procedures. Both lignocaine and articaine are amide-type anesthetics known for their ability to block nerve conduction and provide pain relief during oral surgeries, such as tooth extractions.^{9,10} While lignocaine has been a standard choice for many years, articaine has gained popularity in recent decades due to its enhanced tissue penetration and rapid onset.

Our study included 40 participants, with 18 males and 22 females. Among males, 8 were aged 18-30 years, and 10 were aged 31-40 years. For females, 10 were in the 18-30 years age group, while 12 were in the 31-40 years group. Group 1 received lignocaine anesthesia, while Group 2 was administered articaine anesthesia. The study assessed two parameters: the duration of action and pain score. For the duration of action, Group 1 had a mean of 127.8 minutes (SD =

5.731), while Group 2 had a mean of 189.2 minutes (SD = 3.626), with a significant difference (P = 0.002). Regarding pain score, Group 1 had a mean score of 1.26 (SD = 0.425), and Group 2 had a mean score of 0.98 (SD = 0.160), also showing a significant difference (P = 0.002).

In the study by Krishna S et al.¹¹, the efficacy of 2% lignocaine with 1:80000 adrenaline and 4% articaine with 1:100000 adrenaline was compared in terms of duration of action and pain control during bilateral premolar maxillary orthodontic extractions. Conducted as a split-mouth study with 50 patients under 30 years, the results indicated that the articaine group experienced a longer anesthetic duration (217 minutes) compared to the lignocaine group (169 minutes). Additionally, articaine provided superior pain control, with a mean visual analogue scale (VAS) score of 1.07, whereas lignocaine had a mean score of 1.53. Both findings were statistically significant (P=0.001). The study concluded that articaine was a more effective local anesthetic for orthodontic

extractions, offering longer anesthesia and better pain reduction than lignocaine.

In the study by Jaiswal P et al.¹² they aimed to compare the anesthetic effectiveness of articaine and lignocaine for bilateral premolar extractions in orthodontic patients. Conducted as a prospective splitmouth study with 30 patients, 4% articaine hydrochloride with adrenaline 1:100000 (Group A) was used on one side, while 2% lignocaine hydrochloride with adrenaline 1:100000 (Group B) was used on the contralateral side. The results showed that Group A had a significantly lower overall pain score (0.43) compared to Group B (2.9). Additionally, the average onset time of anesthesia was quicker in Group A (1.2 minutes) than in Group B (2.55 minutes). The duration of anesthesia was also longer in Group A (70 minutes) compared to Group B (46.5 minutes), with both differences being statistically significant (p<0.05). The study concluded that articaine is an effective alternative to lignocaine for maxillary premolar extractions, providing superior anesthetic efficiency and eliminating the need for painful palatal injections.

In the study by Sandilya V et al.¹³, the aim was to evaluate the efficacy of 4% articaine with 1:100,000 adrenaline when infiltrated buccally for maxillary premolar extractions. The study was conducted as a double-blind randomized clinical trial with a splitmouth design, involving 100 patients. Group 1 received a single buccal infiltration of articaine, while Group 2 received routine buccal and palatal infiltrations of 2% lignocaine with 1:200,000 adrenaline. The parameters assessed included the time to onset of anesthesia, pain during extraction, and the need for additional anesthetic. The results revealed no statistically significant differences between the two groups (P > 0.05), suggesting that a single buccal infiltration of articaine could serve as an effective alternative to lignocaine for maxillary premolar extractions in most cases.

While the study provides valuable insights into the comparative efficacy of lignocaine and articaine in dental extractions, it is important to note that a limitation of this study was the relatively small sample size. As a result, the findings may not be fully representative of a larger population, and the results could vary with a more extensive sample. Further research with a larger sample size would be beneficial to confirm these findings and enhance the generalizability of the conclusions.

CONCLUSION

The study found that articaine provided a longer duration of action and better pain control than lignocaine, leading to a more comfortable and painfree experience for patients undergoing extractions.

REFERENCES

- 1. McLure HA, Rubin AP. Review of local anaesthetic agents. Minerva Anestesiol. 2005;71:59–74.
- Ferger P, Marxkors K. Ein neues Anästhetikum in der Zahnärztlichen Prosthetik. Dtsch Zahnarztl Z. 1973;28:87–89.
- Hendolin H, Mattila M. Hoe-40045, ein neues Lokalanësthetikum verglichen mit Lidocain bei Epiduralanästhesie. Prakt Anaesth. 1974;9:178–182.
- 4. Brinkløv MM. Effectivity of carticaine, a new local anesthetic. A survey and a double blind investigation comparing carticaine with lidocaine in epidural analgesia. Acta Anaesth Scand. 1977;21:5–16. doi: 10.1111/j.1399-6576.1977.tb01186.x.
- Lemming K, Fang G, Buck ML. Safety and Tolerability of Lidocaine Infusions as a Component of Multimodal Postoperative Analgesia in Children. J Pediatr Pharmacol Ther. 2019 Jan-Feb;24(1):34-38.
- Lee JT, Sanderson CR, Xuan W, Agar M. Lidocaine for Cancer Pain in Adults: A Systematic Review and Meta-Analysis. J Palliat Med. 2019 Mar;22(3):326-334.
- Dokken K, Chen RJ, Fairley P. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Mar 2, 2024. Sodium Channel Blocker Toxicity.
- Bailey M, Corcoran T, Schug S, Toner A. Perioperative lidocaine infusions for the prevention of chronic postsurgical pain: a systematic review and meta-analysis of efficacy and safety. Pain. 2018 Sep;159(9):1696-1704.
- Paik AM, Daniali LN, Lee ES, Hsia HC. Local anesthetic use in tumescent liposuction: an American Society of Plastic Surgeons survey. Ann Plast Surg. 2015 Feb;74(2):145-51.
- Meechan JG. Effective topical anesthetic agents and techniques. Dent Clin North Am 2002 Oct;46(4):759-766.
- Krishna S, Bhaskaran R, Kumar SP, Krishnan M. Comparison of the Efficacy Between Articaine and Lignocaine in Simultaneous Bilateral Orthodontic Maxillary Premolar Extractions: A Split-Mouth Comparative Study. Cureus. 2023 Dec 6;15(12):e50078. doi: 10.7759/cureus.50078. PMID: 38192927; PMCID: PMC10771934.
- Jaiswal P, Goyal R, Dubey C, Akhter J, Ramalingam K, Kalita S. A Split-Mouth Clinical Comparative Evaluation of the Anesthetic Efficacy of Articaine and Lignocaine for Maxillary Bicuspids Extraction. Cureus. 2023 Jun 9;15(6):e40167. doi: 10.7759/cureus.40167. PMID: 37431340; PMCID: PMC10329780.
- Sandilya V, Andrade NN, Mathai PC, Aggarwal N, Sahu V, Nerurkar S. A Randomized Control Trial Comparing Buccal Infiltration of 4% Articaine with Buccal and Palatal Infiltration of 2% Lignocaine for the Extraction of Maxillary Premolar Teeth. Contemp Clin Dent. 2019 Apr-Jun;10(2):284-288. doi: 10.4103/ccd.ccd_529_18. PMID: 32308291; PMCID: PMC7145254.