

EFFICACY OF INFERIOR MANDIBULAR NERVE BLOCK (IANB) WITH ARTICAININE INFILTRATION VERSUS LIDOCAINE INFILTRATION ADMINISTERED IN TEETH WITH IRREVERSIBLE PULPITIS

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ABSTRACT

OBJECTIVES

To compare the efficacy of (Inferior mandibular nerve block) IANB with Lidocaine infiltration versus with articaine infiltration in patients with irreversible pulpitis.

METHODOLOGY

An observational cross-sectional study was conducted in the Department of Operative Dentistry and Endodontics at Altamash Institute of Dental Medicine, Karachi. The study was initiated in January-April 2022. A total of 150 patients' positive history of irreversible pulpitis, confirmed with cold pulp testing, were randomly allocated into two groups: 75 cases were treated with standard Inferior mandibular nerve block with Lidocaine buccal infiltration, and 75 were treated with buccal infiltration of 1.8 ml of 4% articaine. Before administering the anaesthetic injection, each subject was shown the visual analogue scale (VAS). After 15 minutes of administration, subjects were asked to rate the pain. The data was recorded on a designed proforma.

RESULTS

The average age of the patients was 35.52±10.09 years. Efficacy of the inferior alveolar nerve block with buccal infiltration of 1.8 ml of 4% articaine was significantly high as compared to Inferior mandibular nerve block with Lidocaine buccal infiltration [73.3% vs 50.67% p=0.004].

CONCLUSION

Buccal infiltration of 4% Articaine for mandibular teeth during IANB can have a high success rate and is considered a good alternative.

KEYWORDS: Inferior Mandibular Nerve Block, Lidocaine Infiltration, Articaine Infiltration

INTRODUCTION

The inferior mandibular nerve block (IANB) technique has been the traditional method of mandibular local anaesthesia.¹ Inferior Alveolar nerve block is implemented via mandibular injection to achieve inferior alveolar nerve block. This has been the most frequently utilized method for endodontic treatment. However, the IANB technique is ineffective in patients with irreversible pulpitis.² It has been shown in endodontic clinical research that inferior alveolar nerve block failure can occur more than 44% of the time in patients with irreversible pulpitis. In light of such findings, it seems advantageous to improve the current technique to increase the Inferior mandibular nerve block success rate in endodontic treatment.^{3,4} The explanation of the failure of Inferior mandibular nerve block can be the activation of nociceptors by inflammation and associated central mechanisms.^{5,6,7} Researchers have proposed that supplementary method such as infiltration anaesthetic techniques can be

utilized in patients with irreversible pulpitis to overcome chances of anaesthetic failure.⁸ Articaine is observed to be a safe option for infiltration, as it has a reputation for providing a more effective local anaesthetic effect.⁹ Various studies have indicated that the difference in the anaesthetic effect of Lidocaine 2% and articaine 4% when used for primary IANB is not very significant.^{10,11} However, one research revealed that although the difference is not significant, articaine provides a more prolonged anaesthetic effect.¹² Several studies have compared the anaesthetic effect of buccal infiltration and inferior alveolar nerve block in mandibular molars. Research findings indicated buccal infiltration with 4% articaine can be an effective alternative to inferior alveolar nerve block. Most of these studies investigated the efficacy of articaine in mandibular posteriors.^{13,14} A clinical findings indicated that the success rate of IANB with lidocaine infiltration is 47% compared to articaine infiltration, which is 67%. Therefore, further, examine articaine's anaesthetic efficacy in patients experiencing irreversible pulpitis.

This randomized, single-blind study was conducted with buccal infiltration performed in posterior mandibular teeth. Endodontic pain management is essential in patients fear and anxiety associated with endodontic treatment. It is significant to have appropriate knowledge of local anesthetic and techniques to utilize for effective pain free oral treatment. The motive of this research is to identify the effectiveness of anesthesia and eliminate pain experience by patient suffering from irreversible pulpitis during the endodontic procedures using the anesthesia which shows better efficacy.

METHODOLOGY

An observational cross-sectional study was conducted from January to April 2022 on the patients visiting the Dental Hospital's outpatient department (OPD). The Ethics Committee of the Institute supervised the study protocols. Participants gave consent and were informed that their study participation would be anonymous, voluntary, and non-compulsory. As a result, there was less than minimal risk to all the participants. The sampling method for this study was non-probability, consecutive sampling. Data collection was done after getting approval from the hospital ethical committee of Altamash Institute of Dental Medicine. Diagnosis is made after taking history, conducting clinical examination, and performing pulp vitality testing. Informed consent was taken from the patient. This is a single-blind study in which the subjects are unaware of the anaesthesia they receive. One hundred fifty patients with irreversible pulpitis in the mandibular molar were selected and randomly divided into two groups through a sealed envelope technique; one group was the control, and the second group was the test group. A control group of 75 subjects received IANB with buccal infiltration of 1.8 ml and 2% of Lidocaine with 1:100,000 epinephrine. In contrast, the test group with 75 subjects received buccal infiltration of 1.8 ml of 4% articaine with 1:100,000 epinephrine. Before administering the anaesthetic injection, each subject was shown the visual analogue scale (VAS). After 15 minutes of administration, subjects were asked to rate the pain. The subjects were placed a mark on the scale where it best described their pain level. Study-dependent variables include pain efficacy of anaesthesia; independent variable includes age and gender. The data was recorded on a designed proforma. Data was entered and analyzed by SPSS version 20, and the mean and standard deviation were calculated for age and VAS score. Frequency and percentage were calculated for gender and efficacy. To measure and compare the efficacy of the groups, a chi-square test was applied with a p-value less than equal to 0.05,

which was taken as significant. Stratification concerning age and gender was done. A post-stratification chi-square test was applied with a p-value less than or equal to 0.05, which was taken as significant. Inclusion criteria include patients with a positive history of irreversible pulpitis confirmed with cold pulp testing, subjects between 18 and 65 years, subjects not taking any medication that affects the pain perception confirmed by history, and subjects provided Informed consent. Exclusion criteria included subjects with reversible pulpitis, allergic to local anaesthetics, pregnant subjects and nursing mothers, subjects taking any medication (over-the-counter pain-relieving medications, narcotics, sedatives, anxiolytic or antidepressant medications), and subjects that did not provide informed consent.

RESULTS

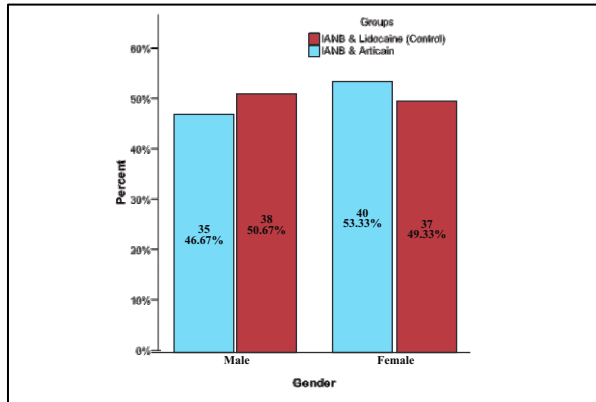
A total of 150 patients' positive history of irreversible pulpitis, confirmed with cold pulp testing, were randomly allocated into groups; 75 cases were treated with standard IANB with buccal infiltration, and 75 were treated with IANB and buccal infiltration of 1.8 ml of 4% articaine. The average age of the patients was 35.52 ± 10.09 years. There were 73(48.7%) male and 77(51.3%) females. Gender status as per group is also shown in Figure 1. Efficacy was considered positive when subjects reported no pain upon cold testing after 15 minutes of anaesthesia administration, i.e., VAS score 0. It was observed that the efficacy of buccal infiltration of 1.8 ml of 4% articaine was significantly higher compared to standard IANB with buccal infiltration [73.3% vs 50.67% $p=0.004$]. Stratification analysis was performed and observed that buccal infiltration of 1.8 ml of 4% articaine was significantly effective as compared to control groups for age ≤ 40 years of age ($p=0.043$); similarly, this was also effective for above 40 years of age ($p=0.047$) so there was no effect of age on outcome as shown in table 1. There was an insignificant difference between male cases; in female groups, a significant difference was observed, as shown in Table 2.

Table 1: Compare the Efficacy between Groups in Patients with Irreversible Pulpitis for Age >40 and ≤ 40 Years

Age	Efficacy	IANB & Lidocaine (Control) n=52	IANB & Articaine n=53	Total	P-Value
≤ 40 Years	Yes	28 (53.8%)	39 (73.6%)	67	0.043
	No	24 (46.2%)	14 (26.4%)	38	
> 40 years	Yes	10 (43.5%)	16 (72.7%)	26	0.047
	No	13 (56.5%)	06 (27.3%)	19	

Table 2: Compare the Efficacy between Groups in Patients with Irreversible Pulpitis for Male and Female Cases

	Efficacy	IANB & Lidocaine (Control)	IANB & Articaine	Total	P-Value
Males	Yes	18 (51.4%)	27 (71.1%)	45	0.085
	No	17 (48.6%)	11 (28.9%)	28	
Females	Yes	20 (50%)	28 (75.7%)	48	0.020
	No	20 (50%)	09 (24.3%)	29	

**Figure 1: Gender Distribution of the Patients Concerning Groups (n=150)**

DISCUSSION

Tooth pain is the most common pain in the orofacial region. Pain control, especially during the early stages of endodontic treatment, is significant and makes both the dentist and the patient confident during the treatment.¹⁵ Patients usually visit the dentist due to severe pain, mainly due to irreversible pulpitis, but at times, pain, to some extent, may persist for a while after successful root canal treatment.¹⁶ Adequate anaesthesia is fundamental for the accomplishment of most dental procedures. Some investigators state that anaesthesia is essential for both the patient and the dental professional; patients opinion on their dental treatment is strictly related to their experience with local anaesthesia. Other authors have reported that many patients select their dentists based on their ability to offer a painless dental treatment. An inferior alveolar nerve block is the technique most frequently used for local anaesthesia when performing restorative and surgical procedures in the mandible; however, the approximate failure rate of these procedures ranges from 5 to 15% or 15 to 20% according to Kaufman (1984), reaching even higher percentages in pulpal anaesthesia.²⁶ Although local anaesthetics are highly effective in producing anaesthesia in normal tissues, they commonly fail in patients with inflamed tissues.¹⁷ For instance, the inferior alveolar nerve block is associated with a failure rate of 15% in patients with normal tissue, 44-81% with irreversible pulpitis and 30% with maxillary infiltration in teeth with

irreversible pulpitis. To compare the efficacy of IANB with Lidocaine infiltration versus with articaine infiltration in patients with irreversible pulpitis, A total of 150 patients, aged between 18 and 65 years, positive history of irreversible pulpitis, confirmed with cold pulp testing were randomly allocated into groups, 75 cases were treated with standard IANB with buccal infiltration, and 75 were treated with supplemental buccal infiltration of 1.8 ml of 4% articaine. Dental problems are the most prevalent oral disease and have a very high morbidity potential. There is no geographic area spared in the world where people do not exhibit some evidence of dental problems. It affects both sexes, all races of any socio-economic status and all age groups. Females experience more significant pain and anxiety as compared to males.¹⁸ It causes pain and discomfort and places a financial burden on the parent. For a long time, preventing dental caries has been considered essential for the health profession. In our study, 150 patients of irreversible pulpitis were included and randomly allocated into two groups: 75 cases were treated with standard IANB with buccal infiltration, and 75 were treated with supplemental buccal infiltration of 1.8 ml of 4% articaine. In our study, Patients with age range between 18 and 65 years, most of the patients were below 30 years of age in both groups. The average age of the patients in the control group was 36.29 years, and in the articaine group was 34.75 years. There were 40% males and 53.3% females in the control group, while males were 50.6% and females were 49.3% in articaine group. In a national study which provides the spectrum of dental disorders in Pakistan, Rehana Maher revealed that the study population included an examination of 1146 persons from four provinces of Pakistan, and it was found that the frequency of periodontal disease increased with age and showed a preponderance of male sex (78.2%) than female (69.8%). In our study, efficacy was considered positive when subjects reported no pain upon cold testing after 15 minutes of anaesthesia administration, i.e., VAS score 0. It was observed that the efficacy of buccal infiltration of 1.8 ml of 4% articaine was significantly higher compared to standard IANB with buccal infiltration. Results of this study showed that successful pulpal anaesthesia was achieved after 4% articaine buccal infiltration at 73.3%. This is similar to Currie et al., who reported a 72.7% success rate of articaine in buccal infiltration.¹⁹ A success rate of 87% has been reported by Robertson et al., which is higher than that of this study. A study by Kanaa et al. showed better results (84%) after buccal infiltration of articaine. Anaesthetic success in this study after buccal infiltration of articaine was higher than the values reported by Dressman et al. Corbett et al. and Haas et al. at 59%, 65% and 64%, respectively. After the

administration of local anaesthetic (articaine/lidocaine) by either technique, a wait of 10-15 minutes was observed for induction of anaesthesia.²⁰ This is based on time, as suggested by previous studies, for injection to take full effect.³⁸

LIMITATIONS

This survey has some limitations because of limited resources like time and money. Due to time constraints, a sample of only 100 respondents was selected. Secondly, this survey is limited to only one dental institute in Karachi, as going to other institutes would take time and money. The results of this survey are only based on questionnaires as this data collection instrument is more time and cost-effective. Moreover, convenience sampling was used as we didn't have any incentive to provide to the respondents. Since this survey used convenience sampling, the number of respondents for each qualification group is not equally divided.

CONCLUSIONS

Buccal infiltration of 4% Articaine with IANB for mandibular teeth can have a higher success rate than lidocaine infiltration with IANB and is considered a good alternative option.

CONFLICT OF INTEREST: None

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