



ORIGINAL ARTICLE

IDENTIFYING THE SUPERIOR ROOT CANAL IRRIGANT BETWEEN HYDROGEN PEROXIDE AND SODIUM HYPOCHLORITE IN POST ENDODONTIC PAIN MANAGEMENT

Zaheer Abbas¹, Tahreem Malik¹, Tamseela¹, Rafay Manan², Farhan Riaz³,
¹THQ, Thal Hospital Layyah

²Senior Registrar, King Edward medical College, Lahore

³Assistant professor, Faryal Dental college Sheikhpura

ABSTRACT

Objective: To Identify the superior root canal irrigant between hydrogen peroxide and sodium hypochlorite in post endodontic pain management.

Place of Study: THQ Thal Hospital Layyah

Study Design: Randomized control trial

Duration of Study: January 2022 to July 2022

Methodology: 104 subjects were selected by non-probability non purposive sampling technique. Informed consent was taken from the patients and they were randomly allocated to 2 study groups i.e. Group A (Sodium Hypochlorite) and Group B (Hydrogen Peroxide). Mechanical preparation of root canals for lower first molar was done in the first appointment. In Group A, 2.5 % Sodium Hypochlorite (NaOCl) irrigant was used, while in Group B, 3% Hydrogen Peroxide (H₂O₂) irrigant was used. The patients were followed up after 10 days. Frequency of endodontic pain on the follow up visit was evaluated by Visual Analogue Scale (VAS). Statistical Package for Social Science (version 23.0) (SPSS) was used to analyse the data. The frequency of endodontic pain was compared between the study arms with chi-square test.

Results: Total 104 participants were placed into 2 groups, 52 cases in each group. 56/104 (54.30%) were males while 48/104 (45.70%) were females. In Group "A" endodontic pain on 10th day follow-up visit was present in 18/52 (34.6%) patients, while in Group "B" endodontic pain on 10th day follow-up visit was present in 35/52 (68%) patients. By using chi-square test it was observed that there was a significant association between groups and presence of endodontic pain having p-value = 0.001

Conclusion: Sodium Hypochlorite was much better than Hydrogen Peroxide in the management of endodontic pain in terms of incidence.

Key words: Endodontic Pain, Sodium Hypochlorite, Hydrogen Peroxide, Root Canal Irrigant

INTRODUCTION

Root canal treatment is a procedure which is performed in the tooth with a disease of irreversible pulpitis, apical periodontitis or apical abscess. Most of the times patient reported with a mild to severe toothache is relieved by root canal treatment (RCT). (1-3) Root canal treatment is an extensive procedure which consists of multiple visits. It is a lengthy procedure in which the tooth is mechanically and chemically cleaned of bacteria and pulpal remnants, shaping of canals and then sealing of canal system along with restoration of the coronal portion to prevent future re infection.(4,5) During Root canal treatment many steps are followed i.e. access cavity formation, root canal preparation,

and root canal obturation. During Root canal treatment pain can occur between the visits. (6,7) There are many reasons for this pain such as, missed canals, over medicament, incomplete debridement, inadequate pulpectomy, over preparation of the canal and inappropriate root canal irrigants.(8,9) This postoperative pain is one of the important factor leading to demotivation of the patient to opt root canal treatment procedure. (10)

Only mechanical preparation of the canal is not sufficient to remove pulpal tissues and bacterial growth which are the usual cause of post-operative pain. Choice of irrigation material can also help to remove pulpal remnants and bacterial growth from the canal. For root canal irrigation variety of irrigants are used such as saline, chlorhexidine, sodium hypochlorite, hydrogen peroxide, EDTA (Ethylene Diamine Tetra Acetic Acid, MTAD (mixture of Tetracycline, Acid and Detergent) and Iodine potassium iodide (IKI). (11-13)

To date no single irrigation fluid can fulfil the criteria of an ideal irrigant. Sodium hypochlorite is considered as good irrigant because it has an excellent bactericidal activity along with its organic debris resorptive property due to which Sodium hypochlorite can clear pulpal tissues which cannot

Correspondence to : Dr. Zaheer Abbas

Dental Surgeon, THQ, Thal Hospital Layyah.

E-mail: zaheerabbas5814@gmail.com

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be removed from the canal mechanically. (14-16) However, sodium hypochlorite is cytotoxic, if extruded beyond the apical foramen, can cause inflammation, swelling, pain and ulceration presenting as hypochlorite injury. The taste and smell are unacceptable and is caustic to the metallic instruments. (17,18)

Hydrogen peroxide is another irrigant which is used to debride the root canal. Hydrogen peroxide produces effervescent which removes the debris from the canal system. It is also considered as bactericidal and fungicidal if used with combination of chlorhexidine. (7)

Several studies have done comparison of different root canal irrigants according to their efficacy, antibacterial potency and their safety against surrounding tissues but no study have been done so far to determine their pain-relieving potential. Therefore, this study is anticipated to identify the superior irrigation agent with respect to their ability to prevent endodontic pain.

METHODOLOGY

This study of 7 months (January 2022 to July 2022) duration was conducted in THQ, Thal Hospital Layyah. The study design was randomized control trial and sampling technique was non probability convenient sampling. Sample size was calculated using the WHO sample size calculator. Confidence Level of 95%, proportional error of 5%, anticipated population proportion with pain in Hydrogen peroxide group was 70% (19), while anticipated population proportion with pain in Sodium Hypochlorite group was 36.7%. (20) Total sample size calculated was 104. This was divided in to two study groups with 52 subjects in each group. Patients of both genders aged between 14 years to 50 years with carious 1st mandibular molar with diagnosed irreversible pulpitis by Cold Test were included in the study. While patients having teeth with resorbed roots, mobility, open apices, periapical radiolucency and Non-vital teeth were excluded. Informed consent was taken from the patients and they were randomly allocated to 2 study groups i.e. Group A (Sodium Hypochlorite) and Group B (Hydrogen Peroxide). Mechanical preparation of root canals for lower

first molar was done in the first appointment. In Group A, 2.5 % Sodium Hypochlorite (NaOCl) irrigant was used, while in Group B, 3% Hydrogen Peroxide (H_2O_2) irrigant was used. The patients were followed up after 10 days. Frequency of endodontic pain on the follow up visit was evaluated by Visual Analogue Scale (VAS) as: "Yes (VAS ranging from 1 to 10) and No (VAS=0). Only one operator performed and evaluated all the cases to ensure standardization.

The study outcome was measured in terms of frequency of endodontic pain compared between the two study arms. Statistical Package for Social Science (version 23.0) (SPSS) was used to analyse the data. Categorical variables like gender and presence/absence of pain were defined as frequencies and percentages. Outcome variable i.e. pain was stratified by age and gender and analysed. Data was presented in the form of tables and diagrams.

The frequency of endodontic pain was compared between the study arms with chi-square test. The frequency of endodontic pain was stratified according to age and gender. Post stratification, chi-square test was used. Probability value of less than 0.05 was considered statistically significant.

RESULTS

The mean age of patients was 29.62 ± 15.279 . Total 104 participants were divided into two groups, 52 cases in each group. 56/104 (54.30%) were males while 48/104 (45.70%) were females. (Figure 1)

In Group A (Sodium Hypochlorite), endodontic pain was present in 18/52 (34.6%) patients, while in Group B (Hydrogen Peroxide) endodontic pain was present in 35/52 (68%) patients. (Table 1). By using chi-square test it was observed that there was a significant association between two groups and presence of endodontic pain having p-value = 0.001 (Table 2). Significant association between participants of < 35 years and presence of endodontic pain was found where the p-value was 0.002. Stratification of endodontic pain in groups with regards to age is shown in Table 3.

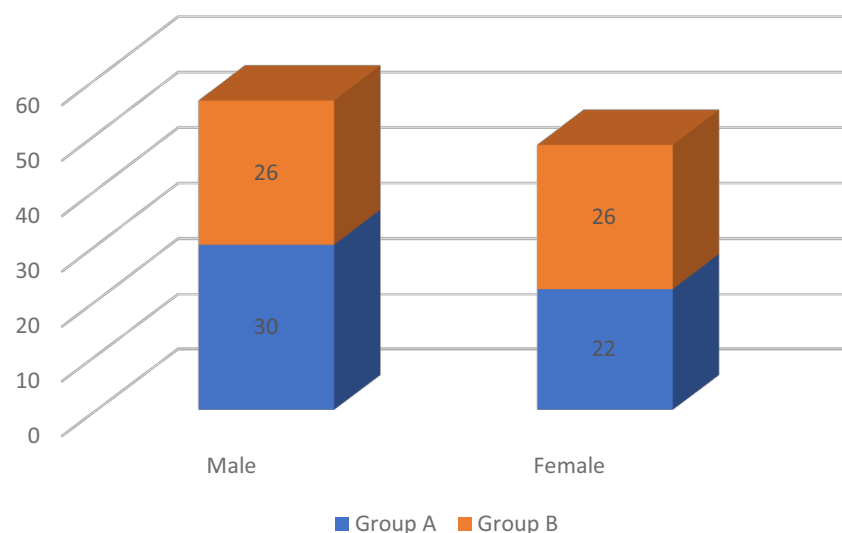


Figure 1: Bar graph showing gender distribution in two study groups

Table 1: Presence of Endodontic Pain (N = 104)

	Endodontic Pain	Frequency	Percent
Group A (NaOCl)	Present	18	34.6%
	Absent	34	65.3%
Group B (H ₂ O ₂)	Present	35	68%
	Absent	17	32%
Total		104	100.0

Table 2: Cross tabulation of Presence of Endodontic Pain between the groups

Groups	Endodontic Pain (VAS)		Total	P-value
	Present	Absent		
Group A (NaOCl)	18	34	52	0.001
Group B (H ₂ O ₂)	35	17	52	

Table 3: Stratification of Endodontic Pain in groups regarding age (n = 104)

Age	Groups	Endodontic Pain		p-value
		Present	Absent	
< 35 years	Group A (NaOCl)	10	18	0.002
	Group B (H ₂ O ₂)	19	09	
≥ 35 years	Group A (NaOCl)	8	16	0.013
	Group B (H ₂ O ₂)	16	08	

DISCUSSION

A tooth with damaged or infected pulp is usually treated by root canal procedure, with primarily aim to save and preserve the natural tooth. It is designed to eradicate bacteria from an infected root canal. Millions of root canal treatments are performed per annum with an extraordinary success rate and high patient's satisfaction rate as it is minimally invasive procedure. (21)

In this study, patients treated with sodium hypochlorite complained of less pain than those treated with hydrogen peroxide. These results are in accordance with those documented by Sangi et al, where 70% patient of hydrogen peroxide group felt pain. (22) Results of this study described that post endodontic pain was observed in 18/52 (34%) patients irrigated with Sodium Hypochlorite, while 35/52 (68%) participants of Hydrogen Peroxide group suffered from post endodontic pain. Ruksakiet et al stated that sodium hypochlorite is an effective germicide and fungicide. Sodium hypochlorite has good tissue dissolving properties due to which it is used widely in the dentistry. Sodium hypochlorite is used in different concentrations like 1%, 2.5%, 3%, and 5.25%. (23-26)

In 2022 Nauman et al studied the frequency and intensity of pain after root canal irrigation with sodium hypochlorite and hydrogen peroxide. (17) They concluded that sodium hypochlorite is significantly better root canal irrigant than hydrogen peroxide in terms of post endodontic pain experience. Results are comparable to our study where pain control is significantly better with that of sodium

hypochlorite. Azhar Iqbal stated that sodium hypochlorite alone is a good irrigant than hydrogen peroxide. (26) Sodium hypochlorite produces less pain and discomfort post operatively than hydrogen peroxide and has strong antimicrobial properties than hydrogen peroxide. (27) Chlorhexidine along with hydrogen peroxide can show better results but the effervescent produced by hydrogen peroxide can cause damage to the soft tissues. (28) Sodium hypochlorite is stronger bactericidal than hydrogen peroxide and studies showed that less post-operative pain with sodium hypochlorite is due to its strong bactericidal property and less cytotoxic than hydrogen peroxide. (29) Pulp remnants were found to be present even after meticulous root canal preparation by mechanical method and led post-operative pain. To cope with this issue dentist must use root canal irrigants which have tissue dissolving property. Both sodium hypochlorite and hydrogen peroxide have tissue dissolving property, but Sodium hypochlorite has more tissue dissolving activity than hydrogen peroxide due to high alkalinity and low surface tension. Trautmann et al described that sodium hypochlorite had higher pH than hydrogen peroxide which results in proteolytic activity of hypochlorite than hydrogen peroxide. (30) This is the reason for better postoperative pain control with sodium hypochlorite than that of hydrogen peroxide. Many studies have revealed that antimicrobial effect of sodium hypochlorite is very competent against most resistant bacteria like E. Faecalis. Hydrogen peroxide alone cannot cope with resistant bacteria so combination of chlorhexidine is required for antibacterial activity. (31) Incompetent disinfection by hydrogen peroxide is also the reason for more postoperative pain experience in patients in which hydrogen peroxide was used as irrigant.

CONCLUSION

It is concluded that Sodium Hypochlorite has good antibacterial and tissue remnant resorption properties than that of Hydrogen Peroxide. Sodium hypochlorite is concluded as more potent and superior irrigant than hydrogen peroxide in terms incidence and intensity of post-operative pain control in endodontic therapy.

LIMITATIONS

Any anti-bacterial test was not used to prove antibacterial property of the solution. Flare up rate of root canal preparation is not mentioned the study. Sample size was small and population type was limited to a mid-level hospital.

Conflict of Interest: None

Patient Consent: Inform Consent were taken

Ethical Approval: Ethical approval was taken from the Ethical Committee of THQ, Thal Hospital Layyah on Feb, 13, 2022 vide Letter No. 191

Author's Contribution:

ZA, TM: Study design, data collection and analysis

RM, FR: Manuscript preparation, drafting and revising

ZA, TM & T: Review and final approval of manuscript

All the authors have approved the final version of the manuscript to be published

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