

Comparison of the Clinical Efficacy of 2.5% Non-Heated Sodium Hypochlorite and 2.5% Heated Sodium Hypochlorite as Irrigation to Control Postoperative Pain in Single Visit Root Canal Treatment

MUHAMMAD WALEED¹, FARAH TASLEEM², SARWANAND³, NOORULLAH JAGIRANI⁴, FOZIA RAJPUT⁵, DOUA TASLEEM⁶

¹BDS, M.Sc (Operative Dentistry) Liaquat University of Medical and Health Sciences, Jamshoro

²BDS, MSc Senior Lecturer Dentistry department, ISRA University, Karachi

³BDS, MSc. Senior Registrar, Bibi Aseefa Dental College, Larkana

⁴BDS, FCPS Trainee, Liaquat University of Medical and Health Sciences, Jamshoro

⁵BDS, MSc, FCPS Assistant Professor Dentistry department, Liaquat University of Medical and Health Sciences, Jamshoro

⁶BDS, Liaquat University of Medical and Health Sciences, Jamshoro

Corresponding Author: Dr. Farah Tasleem, Email: farah_tasleem@hotmail.com, Cell No: +923453636778

ABSTRACT

Objective: To compare the clinical efficacy of 2.5% non-heated sodium hypochlorite and 2.5% heated sodium hypochlorite as irrigation to control postoperative pain in single visit root canal treatment.

Study Design: Comparative analytical study

Place and Duration: Operative dentistry department of Liaquat University of Medical and Health Sciences, Jamshoro for 6 months duration from March 2017 to September 2017.

Material and Methods: A total of 60 patients with single rooted maxillary and mandibular permanent teeth were randomly allocated into two groups. 30 patients were in group A and treated with non heated sodium hypochlorite solution and 30 patients in group B were treated with 2.5% heated sodium hypochlorite solution. In both groups, the level of pain was measured postoperatively after 48 hours by using Heft Parker visual Analog Scale of 10 and information was collected on Performa.

Results: The average age of the patients was 28.62±6.06 years. There were 40(66.7%) male and 20(33.3%) female. Pain was reduced in both groups but there were no significant difference in reduction of pain between groups (p=0.640).

Conclusion: Severity of pain was not statistically significant between groups. At 48 hours, Pain was reduced in both groups but there were no significant difference in reduction of pain between groups. Heated sodium hypochlorite to relieve postoperative pain, it should be new trend for recommendation for treatment of irreversible pulpitis in single visit root canal treatment.

Key Words: Root canal, Heated sodium hypochlorite, Postoperative pain.

INTRODUCTION

The purpose of RCT (root canal therapy) is to have a root canal structure free from damaging irritants; due to the residual microorganisms in necrotic pulps which cause persistent inflammation into the periradicular tissues and treatment failure [1, 2]. Remaining microorganisms after root canal treatment along with disinfection contribute significantly in the failure of endodontic treatment [3]. There have been numerous steps made to decrease the amount of root canal microorganisms, together with the application of multiple instrumentation methods, irrigation schemes and intracanal medicines [3]. NaOCl (Sodium hypochlorite) is most widely practiced root canal irrigant, which has both antibacterial & tissue dissolving characteristics [4, 5]. Irrigation aids in debridement, lubricants which facilitate the negotiation of small canals and desiccants which aid in drying before obturation. The files loosen and disrupt material within canals and remove dentin from the walls as shavings and the whole sludge is flushed out with an irrigant. Irrigation assists in removing all organic contents. Since Walker first recorded, the use of sodium hypochlorite (NaOCl) in 1936, which is a commonly recognized irrigant for root canal [6]. It functions primarily as a powerful antimicrobial agent & an efficient organic solvent for essential, necrotic and corrected cells [7-9]. Root canal may be accomplished utilizing two methods: first, therapy in

several visits where accumulated bacteria are removed or inhibited from colonizing into root canal structure and intracanal medication during RCT; and second, removal of the residual bacteria via confining them into a complete 3-D obturation, completion of management in one root canal [10].

Sodium hypochlorite heating amplifies tissue solubility and properties of debridement [11-12]. Raising the temperature of low sodium hypochlorite solutions enhances their ability to dissolve tissues [13]. Heated NaOCl solutions seem to enhance the dissolution capacity and effectiveness of their necrotic pulp tissue against *E. faecalis* cells [14].

As limited research is done on clinical effect of 2.5% heated sodium hypochlorite to relieve postoperative pain, so if it is successful then it can set new trend for recommendation for treatment of irreversible pulpitis in single visit root canal treatment.

MATERIALS AND METHODS

A comparative analytical study was done in Operative dentistry department of Liaquat University of Medical and Health Sciences, Jamshoro for 6 months duration from March 2017 to September 2017. Non probability purpose sample technique was used in this study. The study was conducted after taking the informed written consent. Total number of 60 patients were selected and divided into two

groups (A and B, each consist 30 Patients) on the basis randomization. Patients with single rooted maxillary and mandibular permanent teeth, tooth with irreversible pulpitis and patients with age 18-50 years were included in this study. Patients with teeth with periapical abscess (swelling), multi-rooted teeth, periodontal compromised teeth (mobility + excessive bone loss), children, pregnant women, mentally or physically handicapped patients and patients with history of diabetes were excluded in this study. Sample size using open Epi epidemiological calculator, the study being a clinical test standing the clinical efficacy of 2.5% non-heated sodium hypochlorite and 2.5% heated sodium hypochlorite as irrigation to control postoperative pain in single visit root canal treatment.

In Group A, after administration of local anesthesia containing 2% xylocaine with epinephrine 1:100000 in 1.8 ml cartridge (Medicain, Korea) and isolation with rubber dam, access preparation was performed using #2 diamond round bur and #2 diamond fissure bur (Alphe dental diamond burs USA) in a high speed hand piece (Apple Dental). After location of canal orifice and determination of working length the canals were prepared with manual step back technique using NITI files during preparation irrigation was done with non-heated 2.5% sodium hypochlorite with disposable syringe, and root canal treatment was completed in single visit by obturation the canal with Guttapercha points (Meta biomade, Korea) and sealer (sealapex Sybron endo) with lateral compaction technique and tooth was restored with final restoration.

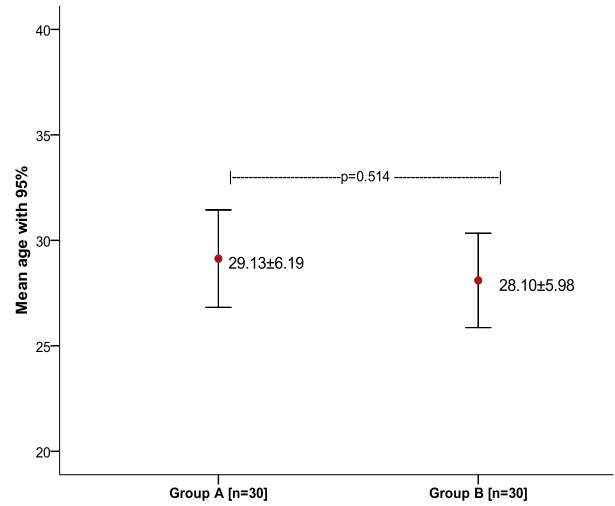
In Group B, same material and method was use as in group A, except the irrigation in which 2.5% Sodium hypochlorite was heated in the COFFEE CUP HEATING DEVICE at the temperature of 60°C, the temperature was measured with thermometer, then heated sodium hypochlorite was filled into the disposable syringe to irrigate the canal during cleaning and shaping after the follow up of 48 hours we will check post-operative pain of the patient. In both groups, the level of pain was measured postoperatively after 48 hours by using Heft Parker VAS of 10. (0: no pain, 1-3 : mild pain, 4-7: moderate pain and 8-10: severe pain) A proforma printed with VAS was given to the patients to mark the level of pain during 48 hours .In case of severe pain medicine (ibuprofen-600mg/BD) was prescribed to the patient 'with this restriction to not take any other tablet, and he/she was provided a contact number to contact with dentist immediately or he/she was explained to come to OPD without taking prior appointment.

Data of the study was analyzed by using the SPSS version 17. Mean and standard deviation was presented for the age and analyzed by independent sample t test. Frequency and percentage were computed for gender, type of tooth, severity of pain. The Chi-square test was used to compare the outcome between groups. P-value less than 0.05 was considered as significant.

RESULTS

The average age of the patients was 28.62±6.06 years. Mean age was not statistically significant between groups as shown in figure 1.

Figure 1: Comparison of Mean Age between groups



There were 40 (66.7%) male and 20(33.3%) female. Gender distribution with respect to groups, maxillary, mandibular and type of tooth are presented in table 1.

Table 1: Type of tooth, gender distribution, Maxillary and Mandibular with respect to groups.

Variable	Group A	Group B
Type of Tooth		
Premolar	10(16.67%)6(10%)	
Canine	10(16.67%)6(10%)	16(26.67%)
Central incisor	10(16.67%)6(10%)	8(13.33%)
Gender		
Male	21(35.00%)	19(31.67%)
Female	9(15.00%)	11(18.33%)
Maxillary	13(21.67%)	12(20.00%)
Mandibular	12(28.33%)	18(30.00%)

Pretreatment most of the patients (80%) had severe pain and 20% had moderate pain. Severity of pain was not statistically significant between groups. At 48 hours, it was observed that 90% patients had no pain in group A and 93.3% in group B while 10% pain was observed in group A and 6.7% was in group B. Pain was reduced in both groups but there were no significant difference in reduction of pain between groups (p=0.640). Comparison of pain between groups is shown in table 2.

Table 2: Comparison of Pain between groups

Time	Pain	Group A n=30	Group B n=30	P-Value
Pre Treatment	No pain	0(0%)	0(0%)	0.197
	Mild	0(0%)	0(0%)	
	Moderate	8(26.7%)	4(13.3%)	
	Severe	22(73.3%)	26(86.7%)	
At 48 hours	No pain	27(90%)	28(93.3%)	0.640
	Mild	3(10%)	2(6.7%)	
	Moderate	0(0%)	0(0%)	
	Severe	0(0%)	0(0%)	

DISCUSSION

The objective of root canal therapy is to provide an atmosphere that irradiates infection in periapical tissues and promotes ordinary tissue reestablishment. Endodontic treatment is the option of therapy with or without periapical lesion for irreversible pulpitis with achievement levels of up to 98 times^[15].

RCT is a conventional dentistry treatment element and is conducted on most patients with achievement levels varying from 30 to 98%.^[16] Studies have shown that most clinicians finish their RCT on various trips.^[18-19] However, over 70 percent of colleges in all geographical fields and numerous scientists have been advocating a single-visit RCT over the last few centuries.^[16-17]

After initiation of (RCT), postoperative suffering is one of the main complications. It has several triggers including anxiety, preoperative pain, level of personal pain, remaining pulp tissue, periapical tissue mechanical and chemical discomfort.^[20] The study revealed that only 12.8% of dentists surveyed believed that necrotic paste bones could be effectively handled in one trip. They believed that one root canal therapy trip should be recommended for essential pulp and instances of instant peri-radicular surgery only.^[21] However, in another study, 86 percent of postgraduate endodontic programs managers indicated that non-surgical one-visit therapy was component of their program centered on favourable findings that indicated no distinction in treatment problems or achievement levels relative to teeth handled in various visits.^[22] In addition, they anticipated that one-visit therapy behavior would enhance..

Most of the nurses (80%) had serious suffering in the current research pretreatment and 20% had mild suffering. Results of the Alonso-Ezpeleta et al study^[23] indicate that although 7-17% of patients reported no POP at any moment, strikingly, 83 people encountered some amount of pain throughout the week following root canal therapy. This proportion of cases experiencing pain is highly recorded in literature^[24-25]. Taking into account that 1 and 2 rates of suffering (soft sensation) are only "postoperative discomfort," this must be known. Furthermore, the shift in a subject's behavior due to the particular recognition and position obtained from participating in an inquiry, may cause nurses to overrate their pain rates. Considering pain level up to 2, only 36 percent of patients stated pain. This outcome is in consensus with that of Gondimet al.^[26-27], who used two irrigation methods to compare post-endodontic pain and recorded 34 digit pain following 4 hours. After 24 hours, Ng et al.^[27] recorded an incidence of 40% postoperative discomfort. A study of postoperative endodontic suffering, however, revealed a broad variety of injury rates from 3% to 58%.^[24]

This outcome was similar to 54.2 points obtained at 1 day postoperative evaluation by Oginni and Udoye in 2004, but the small distinction could be due to the distinct pain ranking scale (mental pain ranking scale) used by Oginni and Udoye.^[27] El Mubarak and coauthors, 2010 using a visual analog scale of 1-4, came at a serious pain incidence of 9.4 times at 1 day postoperative compared to 0% postoperative severe pain in this study.^[28] The incidence of substantial discomfort (mild to serious pain) of 17.8 percent, is greater than 10–15.6 percent from other

studies.^[29,30] This distinction could be ascribed to the more comprehensive scale of global pain assessment used in this research than the mental pain ranking scales used in those other research. Furthermore, these previous surveys did not have obviously described requirements for incorporation and rejection or thorough debate of the type of debridement process used in their research.^[29, 16]

Severity of suffering between organizations was not statistically important. It was noted at 48 hours that 90% of cases had no suffering in band A and 93.3% in team B, whereas 10% of pain was noted in band A and 6.7% in class B. Pain in both communities was decreased, but there was no important distinction between organizations in pain decrease ($p=0.640$). A 2008 research found the prevalence of postoperative discomfort after root canal therapy to be between 3% and 58%.^[6] Numerous trials were undertaken to match the incidence and seriousness of postoperative discomfort after one and two-visit endodontic therapy of both essential and non-vital, single and various shaped bones. Roane who discovered that the incidence of suffering was smaller in the final tour cluster (15.2%) relative to the two tour cluster (31.2%).^[27] Soltanoff recorded 64% incidence of post-obturation suffering in one tour and 38% incidence of discomfort in two encounter endodontics.^[30]

Pain awareness is a extremely personal and varying practice modulated by various physical and psychological factors.^[31] Many variables other than the laboratory method influence pain disclosure. Furthermore, pain measurement is fraught with many risks and error opportunities.^[32] A Visual Analog Scale (VAS) has been used in this research to assess pain. A correctly constructed VAS is a credible ratio scale for natural pain and unpleasantness assessment.^[33]

CONCLUSION

Severity of pain was not statistically significant between groups. At 48 hours, Pain was reduced in both groups but there were no significant difference in reduction of pain between groups. Heated sodium hypochlorite to relieve postoperative pain, it should be new trend for recommendation for treatment of irreversible pulpitis in single visit root canal treatment

REFERENCES

1. Love RM. Enterococcus faecalis--a mechanism for its role in endodontic failure. *IntEndod J.* 2001;34(5):399–405
2. Molander A, Reit C, Dahlen G, Kvist T. Microbiological status of root-filled teeth with apical periodontitis. *IntEndod J.* 1998;31(1):1–7.
3. Sassone LM, Fidel RA, Murad CF, Fidel SR, Hirata R., Jr Antimicrobial activity of sodium hypochlorite and chlorhexidine by two different tests. *AustEndod J.* 2008;34:19–24.
4. Gomes BP, Ferraz CC, Vianna ME, Berber VB, Teixeira FB, Souza-Filho F.J. *In vitro* antimicrobial activity of several concentrations of sodium hypochlorite and chlorhexidine gluconate in the elimination of Enterococcus faecalis. *IntEndod J.* 2001;34:424–8.
5. Vianna ME, Gomes BP, Berber VB, Zaia AA, Ferraz CC, de Souza-Filho F.J. *In vitro* evaluation of the antimicrobial activity of chlorhexidine and sodium hypochlorite. *Oral Surg Oral Med Oral Pathol Oral RadiolEndod.* 2004;97:79–84.

6. Naenni N, Thoma K, Zehnder M. Soft tissue dissolution capacity of currently used and potential endodontic irrigants. *J Endod.* 2004;30:785-7.
7. Abou-Rass M, Oglesby SW. The effects of temperature, concentration and tissue type on the solvent ability of sodium hypochlorite. *J Endod.* 1981;7:376-377.
8. Cunningham WT, Balekjian AY. Effect of temperature on collagen-dissolving ability of sodium hypochlorite endodontic irrigant. *Oral Surg Oral Med Oral Pathol.* 1980;49:175-177.
9. yunhh,kimsk:a comparison of the shaping abilities of 4 nickel titanium rotary instruments in simulated root canals,oral surgery oral medicine oral patho oral radiolendod 95:228,2003
10. Bystorm A, Sundqvist G. Bacteriologic evaluation of the effect of 0.5 percent sodium hypochlorite in endodontic therapy. *Oral Surg Oral Med Oral Pathol.* 1983; 55: 307-12.
11. Abou-Rass M, Oglesby SW. The effects of temperature, concentration and tissue type on the solvent ability of sodium hypochlorite. *J Endod.* 1981;7:376-377.
12. Cunningham WT, Balekjian AY. Effect of temperature on collagen-dissolving ability of sodium hypochlorite endodontic irrigant. *Oral Surg Oral Med Oral Pathol.* 1980;49:175-177.
13. Rosenthal S, Spangberg L, Safavi K. Chlorhexidine substantivity in root canal dentine. *Oral Surg Oral Med Oral Pathol.* 2004;98:488-92.
14. AlJadaa A, Paqué F, Attin T. Acoustic hypochlorite activation in simulated curved canals. *J Endod.* 2009;15:1-5
15. Edionwe JI, Shaba OP, Umesi DC. Single visit root canal treatment: a prospective study. *Niger J Clin Pract.* 2014;17(3):276-81.
16. Travassos RM, Caldas Ade F, de Albuquerque DS. Cohort study of endodontic therapy success. *Braz Dent J* 2003;14:109-13.
17. Friedman S, Mor C. The success of endodontic therapy-healing and functionality. *J Calif Dent Assoc* 2004;32:493-503.
18. Akpata ES, Sofolahan OO, Ufomata D. Pattern of endodontic practice in Nigeria. *Niger Dent J* 1983;4:53.
19. El Mubarak AH, Abu-bakr NH, Ibrahim YE. Post-operative pain in multiple-visit and single-visit root canal treatment. *J Endod* 2010;36:36-9.
20. Calhoun RL, Landers RR. One appointment endodontic therapy: a nation wide survey of endodontists. *JOE* 1982;8:35.
21. Landers RR, Calhoun RL. One appointment endodontic therapy: an opinion survey. *JOE* 1980;6:799.
22. Alonso-Ezpeleta L, Gasco-Garcia C, Castellanos-Cosano L, González JM, López-Frías FJ, Segura-Egea JJ. Postoperative pain after one-visit root-canal treatment on teeth with vital pulps: Comparison of three different obturation techniques. *Med Oral Patol Oral Cir Bucal.* 2012;17 (4):e721-7.
23. Sathorn C, Parashos P, Messer H. The prevalence of postoperative pain and flare-up in single- and multiple-visit endodontic treatment: a systematic review. *IntEndod J.* 2008;41:91-9.
24. Gondim E Jr, Setzer FC, Dos Carmo CB, Kim S. Postoperative pain after the application of two different irrigation devices in a prospective randomized clinical trial. *J Endod.* 2010;36:1295-301.
25. Oginni AO, Udoye CI. Endodontic flare-ups: Comparison of prevalence between single and multiple visit procedures in patients attending a Nigerian teaching hospital. *Bio Med Central Oral Health.* 2004;4:4.
26. Ng YL, Glennon JP, Setchell DJ, Gulabivala K. Prevalence of and factors affecting post-obturation pain in patients undergoing root canal treatment. *IntEndod J.* 2004;37:381-91
27. Roane JB, Dryden JA, Grimes EW. Prevalence of post-operative pain after single and multiple visit endodontic procedures. *Oral Surg Oral Med Oral Path.* 1983; 55: 68-72.
28. Albashaireh ZS, Alnegrish AS. Postobturation pain after single- and multiple-visit endodontic therapy. A prospective study. *J Dent* 1998;26:227-32.
29. Peng L, Ye L, Tan H, Zhou X. Outcome of root canal obturation by warm gutta-percha versus cold lateral condensation: a meta-analysis. *J Endod* 2007;33:106-109
30. Stamos DE, Squitieri ML, Costas JF, Gerstein H. Use of ultrasonics in single visit endodontic therapy. *J Endodon* 1987; 5: 246-9.
31. Harrison JW, Baumgartner JC, Sves TA. Prevalence of pain associated with clinical factors during and after root canal therapy. Part I. Interappointment pain. *JOE* 1983; 9: 384.
32. Galberry JH. Prevalence of post-operative pain in one appointment and multiple appointment endodontic therapy: a pilot study. Louisiana State University; 1983.
33. DiRenzo A, Gresla T, Johnson BR, Martin R, Tucker D, BeGole EA. Post-operative pain after one and two visit root canal therapy. *Oral Surg Oral Med Oral Pathol Oral RadiolEndod.* 2002;93:605-10.