

ORIGINAL RESEARCH

An In-Vitro Assessment of Efficiencies of Various Irrigants in Removal of Triple Antibiotic Paste from the Root Canal Spaces: An Original Research Study

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Received: 27 September, 2023

Accepted: 29 October, 2023

ABSTRACT

Background and Aim: Failure of root canal therapy is highly common in day to day routine dental practice. Ultimate failure is dependent upon several factors. Various researchers have tried several precaution methods to minimize these dilemmas. Incomplete debridement and cleaning is one of the prime factors responsible for failure of endodontic therapies. The sole aim of this in-vitro study was to assess the efficiencies of 3 newer irrigants in removal of Triple Antibiotic Paste and debris from the root canal spaces. **Materials & Methods:** This in vitro study was conducted on twenty four maxillary central incisors. Original length measurements and other stages were done in standard manner by K file systems. All sample teeth were divided into three study groups of 8 each. In group one samples, Sod-H3 root canal irrigant was used while in group two samples, Pyrax RC Clean was used. In group three samples, Rident R-CMCP root canal irrigant was used precisely. Single expert observer was asked to evaluate the stereomicroscopic pictures of all samples for the presence or absence of canal debris. Results thus obtained was compiled and sent for necessary statistical analysis. P value less than 0.05 was considered significant ($p < 0.05$). **Results:** All relevant data were sent for statistical analysis. Sod-H3 appears to be very efficient and showed 1 score in seven out of eight samples. Statistical description for group 1: Sod-H3 showed highly significant p value (0.02). Statistical description for group 2: Pyrax RC Clean showed non-significant P value. Statistical description for group 3: Rident R-CMCP also showed non-significant P value. ANOVA Analysis, for Group 1, 2 & 3 also confirmed highly significant P value. **Conclusion:** Within the limitations of the study authors concluded that Sod-H3 was highly efficient irrigant when compared to other two studied irrigants. Rident R-CMCP showed minimum irrigating efficiency therefore Sod-H3 has been suggested in difficult and cumbersome clinical situations.

Keywords: Sod-H3, Pyrax RC Clean, Rident R-CMCP, Stereomicroscope, RC Irrigant, Triple Antibiotic Paste

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INTRODUCTION

Endodontic therapy is one of the most practiced dental treatments since decades. Ultimate success of the root canal treatment is dependent on several factors.¹⁻⁴ Some are preoperative and patients or host related while others are intra-operative procedure related wherein skill of operator is in question. Additionally post-operative factors are primarily associated with poor after care and loss of follow up.⁵⁻⁹ Literature has also well evidenced about material failure in these regards. In recent past, researchers have experimented

many newer materials to minimize the incidence of failure of endodontic therapy.¹⁰⁻¹³ Many of these approaches are targeted towards the efficient cleaning of the root canal after meticulous biomechanical preparation and shaping. Hypo solution is most commonly used as canal irrigant as per several research papers.^{1,9,14,15} It has several reported drawbacks also like taste alteration and undue disturbance of oral flora. Considering all these clinical issues, researchers have developed some advanced root canal irrigating materials. However, one cannot

use a single material in all clinical setups. It is therefore important to know about the behaviors and prognosis of the materials before applying. Considering all these factors, this study was planned and conducted to assess the efficiencies of three newer irrigants in removal of Triple Antibiotic Paste and debris from the root canal spaces.

MATERIALS & METHODS

This in vitro study was conducted on freshly extracted teeth. Total twenty four maxillary central incisors were collected for the study. Only a-traumatically extracted and non-carious teeth were studied. The basic idea was to achieve single rooted and cross-sectional root form. These features were essential for managing uniformity and smoothness of the study and sample testing under different circumstances. Since authors needed only root portion of the sample teeth, all the crown portions were sectioned so as to simulate with similar clinical conditions. Initial length measurements and other steps were done in usual standard manner. K file systems were used primarily for this purpose. Triple Antibiotic Paste was utilized uniformly in all samples. Root canal orifices were also prepared and instrumented to facilitate biomechanical preparation in rest of the canal. During all through instrumentations, the canals were comprehensively with allotted group respective irrigant. All 24 sample teeth were divided into three study groups of 8 each. In group one samples, Sod-H3 root canal irrigant was used while in group two samples, Pyrax RC Clean was used. In group three samples, Rident R-CMCP root canal irrigant was used precisely. All samples were dried professionally by paper points. For accurate positioning and examination purpose, all sample roots were collected and bisected into two equal longitudinal halves and examined under stereomicroscope. Efficiency of Triple Antibiotic Paste and debris removal and cleaning of the root canals were assessed by scoring method of observer. Single expert observer was asked to evaluate the stereomicroscopic pictures of all samples for the presence or absence of Triple

Antibiotic Paste and canal debris. Score one means no practicable remnant at all. Score two means little areas of debris. Score three means numerous areas of Triple Antibiotic Paste and debris. Score four means numerous areas of Triple Antibiotic Paste and debris in dense coagulated form. Results thus obtained was compiled and sent for necessary statistical analysis. P value less than 0.05 was considered significant ($p < 0.05$).

STATISTICAL ANALYSIS AND RESULTS

All relevant data were sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 22.0 (IBM Inc., Armonk, New York, USA). The screened data was subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi-square test, standard error and 95% CI. Initial outcomes of the results were very crucial. Table 1 shows estimated scoring chart for all three commercial irrigants including Sod-H3, Pyrax RC Clean, Rident R-CMCP. Sod-H3 seems to be very efficient and showed 1 score in seven out of eight samples. Pyrax RC Clean confirmed less irrigating activity as compared with Sod-H3. Rident R-CMCP confirmed minimum irrigating activity among all three tested irrigants. Table 2 shows Fundamental statistical description with level of significance evaluation using pearson chi-square test [group 1: Sod-H3]. P value was highly significant here (0.02). Table 3 demonstrates about fundamental statistical description with level of significance evaluation using pearson chi-square test [group 2: Pyrax RC Clean]. P value was non-significant here. Table 4 demonstrates about fundamental statistical description with level of significance evaluation using pearson chi-square test [group 3: Rident R-CMCP]. P value was non-significant here. Table 5 shows about basic statistical interpretations of Between Groups, Within Groups and Cumulative [ANOVA Analysis, for Group 1, 2 & 3]. P value was highly significant here (0.001). Table 6 shows about two sample t- test assessment of mean score and standard deviation in all three study groups.

Table 1: Estimated scoring chart for all three commercial irrigants including Sod-H3, Pyrax RC Clean, Rident R-CMCP

Sample No	SCORES				
	Group 1 [Sod-H3]	Group 2 [Pyrax RC Clean]	Group 3 [Rident R-CMCP]	P value	Sig.
1	1	2	1	0.10	Non-Sig.
2	1	1	2	0.30	Non-Sig.
3	1	1	1	0.40	Non-Sig.
4	1	2	1	0.10	Non-Sig.
5	1	1	3	0.20	Non-Sig.
6	1	1	2	0.01	Sig.
7	2	1	1	0.02	Sig.
8	1	2	2	0.10	Non-Sig.

Table 2: Fundamental statistical description with level of significance evaluation using pearson chi-square test [Group 1: Sod-H3]

Groups	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Group 1	1.029	0.901	0.493	1.12	1.246	2.0	0.02*

Table 3: Fundamental statistical description with level of significance evaluation using pearson chi-square test [Group 2: Pyrax RC Clean]

Groups	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Group 2	1.329	0.673	0.142	1.44	1.133	1.0	0.70

Table 4: Fundamental statistical description with level of significance evaluation using pearson chi-square test [Group 3: Rident R-CMCP]

Groups	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Group 3	1.769	0.112	0.102	1.23	1.545	2.0	0.30

Table 5: Basic statistical interpretations of Between Groups, Within Groups and Cumulative [ANOVA Analysis, for Group 1, 2 & 3]

ANOVA					
Parameters	Degree of Freedom	Sum of Squares Σ	Mean Sum of Squares $m\Sigma$	F	Level of Significance (p value)
Between Groups	2	1.032	1.237	1.3	0.001*
Within Groups	13	1.183	0.122		-
Cumulative	110.10	4.303			*p<0.05 significant

Table 6: Two sample t- test assessment of mean score and standard deviation in all three study groups

Two sample t- test	Group I		Group II		Group III	
	Mean Score	SD	Mean Score	SD	Mean Score	SD
Values	1.029	0.901	1.329	0.673	1.769	0.112
P-value	0.001 (Significant)		0.820 (Non- Sig.)		0.710 (Non- Sig.)	

DISCUSSION

Literature has well evidenced about several materials those have been tested for their root canal cleaning efficiencies.¹⁶⁻²¹ Most of these materials are clinically acceptable however none of the material is having ideal properties.²²⁻³⁰ Lambrianidis and associates have studied about the removal efficacy of various calcium hydroxide/chlorhexidine medicaments from the root canal.³¹ Their study results were highly significant and clinically applicable. da Silva and co-workers have studied about microscopic cleanliness of the apical root canal after using calcium hydroxide mixed with chlorhexidine, propylene glycol, or antibiotic paste. They also advocated about successful usage of calcium hydroxide mixed with chlorhexidine.³² The clinical behavior of this combination was somewhat similar to Sod-H3 of our study. Nasab Mobarakeh and other researchers have also conducted similar imperative study to know the effect of various irrigating devices on the removal of two different forms of calcium hydroxide from internal resorption cavities.³³ They concluded that calcium hydroxide based materials have superior canal cleaning efficiency compared to other similar materials. Triple antibiotic paste has also been studied comprehensively in these regards and it is very

popular also. However, many of the researchers have confirmed nominal allergic reactions because of its components. One of the obvious limitations of our study was limited number of samples.

CONCLUSION

In this study total three commercially available root canal irrigants were evaluated for their efficiencies during root canal irrigation procedure of BMP. Cleaning efficiency for Triple Antibiotic Paste and debris was checked. Authors found that Sod-H3 was highly efficient irrigant when compared to other two studied irrigants. Rident R-CMCP showed minimum irrigating efficiency therefore Sod-H3 has been recommended in challenging and cumbersome clinical situations. Our study inferences should be taken as suggestive for assuming outcomes for similar clinical circumstances. Additionally authors also some future large scale studies to be conducted in these regards.

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