

## **Comparative Evaluation of effect of Chlorhexidine, Aloe vera and Green Tea on Push out Bond Strength of a Resin Sealer- An in Vitro Study**

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### **Abstract**

#### **Introduction:**

Effective cleaning and shaping of the root canal, as well as the creation of an apical seal, is the essential goal for successful endodontic treatment. Different irrigants and obturation techniques are being used for the same purpose. Irrigating a canal is one of the important steps in root canal treatment. The purpose of irrigation is to remove the smear layer, infective micro organisms and debridement of pulpal tissue.

#### **Aim**

To compare the effect of chlorhexidine, aloe vera and green tea on push out bond strength of a resin sealer.

## **Methodology**

45 non carious single rooted teeth with intact roots were selected and were decoronated. Access opening was done followed by cleaning and shaping primarily with 3% NaOCl. The teeth were randomly assigned into 3 groups of 15 teeth each. Group 1 was irrigated with Chlorhexidine, Group 2 with Aloe Vera and group 3 with green tea. The canals were obturated with GP and Xenon Obtura R root canal sealer and were allowed to set for 72 hours at room temperature and then were sliced into small discs at the level of CEJ of about 2 mm thickness. The dentin discs were subjected to Universal Testing Machine and Push out bond strength of the resin sealer was evaluated.

## **Results**

Green tea showed comparatively high push out bond strength as compared to other groups.

## **Conclusion**

Green tea has better ability to remove the smear layer and can be considered to use it as a root canal irrigant.

## **Key words**

Aloe Vera, Chlorhexidine, Green tea, Resin sealer.

## **Introduction:**

Effective cleaning and shaping of the root canal, as well as the creation of an apical seal, is the essential goal for successful endodontic treatment. Different irrigants and obturation techniques are being used for the same purpose. Irrigating a canal is one of the important step in root canal treatment. The purpose of irrigation is to remove the smear layer, infective micro organisms and debridement of pulpal tissue[1].

CHX can be applied clinically as antimicrobial agent during all phases of the root canal preparation, as root canal irrigant, as an intracanal medicament alone or combined with other substances like calcium hydroxide[2]. Aloe Vera has potent antibacterial, anti fungal, and antiviral properties[3]. Effective cleaning and shaping of the root canal, as well as the creation of an apical seal, is the essential goal for successful endodontic treatment. Different irrigants and obturation techniques are being used for the same purpose. Irrigating a canal is one of the important step in root canal treatment. The purpose of irrigation is to remove the smear layer, infective micro organisms and debridement of pulpal tissue [4]. Catechins and the flavins are present in Green Tea Polyphenols, and they are considered as microbiologically active ingredients[5].

Researches says that most of the failed RCT is due to leakage of irritants to the periapical region.[6] Adhesive properties of endodontic sealers is important to minimise the detachment of material from the dentin and to prevent leakage which provides successful endodontic therapy.[7] Bond strength tests are done in endodontics to test the adhesiveness of the endodontic material to the tooth surface. Increased adhesive property of the material may provide great strength of restored teeth[8].

There are no studies on herbal products like Aloe Vera and green tea as root canal irrigant. Hence the present study was conducted to evaluate the effect of chlorhexidine, Aloe Vera and green tea as root canal irrigant on push out bond strength of a resin sealer.

#### **Materials and methods:**

45 freshly extracted, single-rooted human teeth with intact roots were selected (N=45) and stored in normal saline before use. Teeth with caries, cracks and internal resorption were excluded from the study. All the teeth were decoronated with a diamond disc. Working length was determined using no 15 K-file. Orifice enlargement was done using no 2 Gates Glidden drills. Canals were instrumented with k files using step back technique and were irrigated with 5ml of 3% NaOCl and is then rinsed with 17% EDTA solution. The canals were then irrigated with 5ml of saline.

All samples were randomly divided into 3 groups.

Group 1- chlorhexidine was used as the final irrigant.

2% Chlorhexidine solution [ Everfresh mouthwash]

Group 2- Aloe Vera was used as the final irrigant.

Pure Aloe Vera was extracted from the plant and was grinded, filtered and the solution was used as irrigant

Group 3- green tea was used as the final irrigant.

90% pure green tea was boiled with water, cooled and was used as irrigant. [ Lipton green tea bag]

The canals were then obturated with GP points using the resin sealer [ Xenon Obtura R- Biomed]. All the samples were then stored at room temperature for 72 hours. All samples were sliced into small discs at the level of CEJ of about 2 mm thickness using a diamond disc.

The discs were then subjected to assess the push out bond strength by using Universal Testing Machine (UTM). The discs were placed on a metal slab which has a central hole. The load was applied at a speed of 1mm/ min. Statistical analysis was then done by one way anova test and Post HOC tests ( Tuckey HSD ) to find the significant difference between Group 1, Group 2 and Group 3 using IBM- SPSS statistical software 23.0 version.

#### **Results**

Green Tea showed significantly high push out bond strength compared to other two groups. One way Anova tests showed significant differences between the groups ( $P < 0.05$ ).

P value significant  $P < 0.05$

Mpa								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	15	34.540	5.7250	1.4782	31.370	37.710	25.3	51.4
2	15	35.147	12.3200	3.1810	28.324	41.969	16.1	59.3
3	15	51.967	15.5784	4.0223	43.340	60.594	11.5	80.8
Total	45	40.551	14.2352	2.1221	36.274	44.828	11.5	80.8

**Fig 1: Mean and Standard deviation of Group 1, Group 2 and Group 3**

ANOVA					
Mpa					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2934.846	2	1467.423	10.304	.0002
Within Groups	5981.387	42	142.414		
Total	8916.232	44			

**Fig 2 :Anova test between groups and within groups.**

#### Multiple Comparisons

Dependent Variable: Mpa  
Tukey HSD

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.6067	4.3576	.989	-11.193	9.980
	3	-17.4267*	4.3576	.001	-28.013	-6.840
2	1	.6067	4.3576	.989	-9.980	11.193
	3	-16.8200*	4.3576	.001	-27.407	-6.233
3	1	17.4267*	4.3576	.001	6.840	28.013
	2	16.8200*	4.3576	.001	6.233	27.407

\*. The mean difference is significant at the 0.05 level.

**Fig 3 : Multiple comparison of Group 1, Group 2 and Group 3**

#### Discussion

This invitro study compared the bond strength of a resin sealer (Xenon Obtura R) when exposed to different irrigants like Chlorhexidine, Aloe Vera, and green tea. The push-out testing method allows bond strength measurements of adhesive materials to root canal dentin. The results of the present study showed higher bond strength for the green tea compared to Aloevera and Chlorhexidine. An ideal root canal filling material should have the ability to seal the root canal, should prevent micro leakage , and resist dislodging forces. [9, 10]For a

filling material to adhere properly to the dentin the smear layer and the bacterial residues should be removed completely from the root canals and hence proper irrigation should be done along with cleaning and shaping with good irrigants. [1]

This study shows that green tea has more push out bond strength compared to Aloe vera and Chlorhexidine.

Chlorhexidine has an anti bacterial activity which eventually eliminated *Staphylococcus aureus* and *Candida albicans* within 15 sec, the gel formulation killed *E. faecalis* within 1 min. They show antimicrobial activity against *Porphyromonas endodontalis*, *Porphyromonas gingivalis*, and *Prevotella intermedia* within 15 sec.[11,12] Chlorhexidine is also known to have broad spectrum MMP inhibitory effect[13] which significantly improves the resin- dentin bond stability[1].

Aloe vera has an antibacterial, antifungal and antiviral properties.[13] It also exhibits MMP inhibitory activity against MMP 2 and 9[14]. It can also be used as a cavity disinfectant[15]. Aloe Vera also shows antimicrobial activity against streptococcus mutants which causes caries[16] The main chemical constituents of Aloe vera are aloins and barbaloin and the bactericidal activity is because of anthraquinone. [17, 18]

Green tea has good antibacterial activity against *E. faecalis*[4]. Several studies have demonstrated the antibacterial property of Green tea phenols against different bacterial species [19]. A study used NaOCl, EDTA, saline, morinda citrifolia, azadirachta indica and green tea as a final irrigant. Significantly less bacterial adhesion was observed in samples treated with neem, NaOCl, green tea and morinda citrifolia, respectively [20]. A study states that the use of herbal alternatives as intra canal irrigant should be considered to avoid detrimental properties of NaOCl perhaps in patients who are advocates of natural organic remedies[4].

## Conclusion

The pushout bond strength of green tea was comparatively high and can be considered to be used as a root canal irrigant. More Clinical studies can be done on to validate the result of present study.

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