

Evaluation Of Efficacy Of Cinnamon Oil As A Root Canal Disinfectant - An In Vitro Study

Review Article

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Abstract

Microorganisms play a fundamental role in the aetiology of pulp and periapical diseases. Mechanical preparation and chemical disinfection of the root canal tooth is the most important procedure in endodontics. Several root canal irrigants have been used to disinfect the canals for successful outcomes. Cinnamon is derived from the inner bark of several trees belonging to the genus *Cinnamomum*. Cinnamon has antiviral, anti-fungal, antimicrobial properties and it can ward off a variety of illnesses. The spice has been shown to annihilate candida, a yeast, and inhibit the growth of food borne bacteria, making it a natural food preservative. This study aims to evaluate the effect of cinnamon oil as root canal disinfectant and if cinnamon oil is a better root canal disinfectant than commonly used 0.2% chlorhexidine. An In Vitro study was conducted using freshly extracted single rooted human premolars. Using a gates glidden drill, root canals were enlarged and *Enterococcus Faecalis* was used as the culture suspension. Medicaments were applied to the allotted groups and the microbial growth was assessed using colony forming units per ml [CFU/ml] in all the groups. CFU/ml was very less in the cinnamon oil group compared to other groups. Cinnamon oil proved to have an excellent root canal disinfectant potential than 0.2% chlorhexidine.

Keywords: Cinnamon; Disinfectant; Antimicrobial; Chlorhexidine; Root Canal Treatment; *Enterococcus Faecalis*.

Introduction

Microorganisms play a fundamental role in the aetiology of pulp and periapical diseases. Root canal therapy has been practiced since 1928 and the success rate has been increasing over the years owing to various advancements in the field. A main reason is the total comprehension of the microbiology involved in the endodontic pathology.

Mechanical preparation and chemical disinfection of the root canal tooth is the most important procedure in endodontics. Previous studies highlight the benefits of root canal irrigation in preventing the failure of treatment [1-4]. *Enterococcus faecalis* is more likely to be found in failed cases. The genus *Enterococcus* includes more than 17 species, although only a few cause clinical infections in humans. Since the beginning of the antibiotic era, they have posed major therapeutic challenges. These species

are facultative anaerobic microorganisms that grow in high salt concentrations [5]. *Enterococcus faecalis* [*E. faecalis*] and *Enterococcus faecium* are the most prevalent species cultured from humans, accounting for more than 90% of clinical isolates. *Enterococcus faecalis* is non motile and resists detergents, bile salts, heavy metals, ethanol and azides [5]. *E. faecalis* is resistant to commonly used anti-microbial agents such as cephalosporins.

Cinnamon is derived from the inner bark of several trees belonging to the genus *Cinnamomum* [6]. Cinnamon has antiviral, anti-fungal, and antimicrobial properties. It has been for over thousand years to treat various illness. It is high in a substance called cinnamaldehyde, which accounts for most of the health benefits and powerful antioxidants, such as polyphenols [6]. The antioxidants in cinnamon have anti-inflammatory effects, reducing the risk of disease. This study was undertaken to evaluate the disinfection of dentinal tubules contaminated with *E. faecalis* by using

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Received: February 02, 2021**Accepted:** February 28, 2021**Published:** March 03, 2021

Citation: Santhosh kumar, Suhas Manoharan, Geetha. Evaluation Of Efficacy Of Cinnamon Oil As A Root Canal Disinfectant - An In Vitro Study. *Int J Dentistry Oral Sci.* 2021;08(03):1818-1820. doi: <http://dx.doi.org/10.19070/2377-8075-21000360>

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commercially available cinnamon oil.

Materials and Methods

An invitro study was conducted on 20 freshly extracted single rooted human premolar teeth. The root was sectioned to achieve 6mm long block and external diameter was standardised by the removal of cementum. The blocks were sterilised by autoclaving at 121 C for 20 minutes. The blocks were taken in micro centrifuge tubes to which E. faecalis culture suspension was added and were contaminated for a period of one week. Then the blocks were divided into three groups. First group was washed with saline, second group with cinnamon oil and the third group with 0.2% chlorhexidine. The blocks were sealed above and incubated at 37 C. Following five days of medicament removal, the microbial growth was assessed using colony forming units per ml [CFU/ml] in all the groups. All available data was included in the study to minimise sampling bias. Incomplete data was excluded from the study. Collected data were cross verified, tabulated methodically, statistically analysed and results obtained.

Results

The present study compared the root canal disinfection potential of cinnamon oil with 0.2% chlorhexidine. The colony forming units per ml with cinnamon oil was only 7, where as it was more with other agents [Table 1]. The results revealed that cinnamon oil had significant disinfectant effect on dentinal tubule than other root canal irrigants [Figure 1, Figure 2].

Discussion

Various colonies of microorganisms have been detected in infected root canals [3]. Out of all these occupant species, E. faecalis is the primary reason for disease and reinfection of the root canal [7]. Elimination of E. faecalis from the root canals has consistently been a challenge for complete disinfection of root canals [4].

Complexity of the root canal system, invasion of the dentinal tubules by microorganisms, formation of smear layer and presence of dentin as a tissue are the major obstacles for complete elimination of bacteria during cleaning and shaping of root canal systems. The bacterial community of infected root canals can be decreased by using saline irrigation. However, irrigants that have antibacterial effects have increased effect in bacterial elimination in contrast to saline solution. The irrigants that are used during cleaning and shaping include CHX, NaOCL, EDTA and MTAD. Intracanal medicaments have been used to disinfect root canals and reduce inter-appointment pain. The intracanal medications used frequently in endodontics include Ca(OH)₂ and CH.

The primary goal of root canal treatment is complete cleaning of root canals and removal of microbes [8]. Chemical irrigants are used in practice for a long time by dental practitioners [9]. Chlorhexidine is currently the gold standard being used for root canal disinfection [10]. However, there has been reports of hypersensitivity and allergic reactions related with the utilization of synthetic irrigants [11]. Therefore, an herbal alternative can be considered.

Cinnamon extract has recently gained attention as a root canal irrigant in endodontics due its significant antibacterial properties. Gupta-Wadhwa et al. have showed significant antibacterial effectiveness of cinnamon when compared to other herbal irrigants [12]. Further improvements in the present study can be done by drawing comparisons with other herbal agents [13-16]. The current study utilized the colony forming units per ml to evaluate the antibacterial efficacy of various root canal irrigants. In future, studies can be done to evaluate the antibacterial efficacy of herbal agents using standardized tests such as PCR, there by achieving standardized results.

Conclusion

According to our study, cinnamon oil has a better root canal disinfection potential than 0.2% chlorhexidine. Further studies using other tests are required to evaluate the efficacy of cinnamon oil as

Table 1. Bacterial counts in root canals with use of root canal irrigants.

Groups	CFU/ml*
Cinnamon oil	7
0.2% chlorhexidine	200
Control	3.2 x 10

Colony Forming units per ml.

Figure 1. Before action of cinnamon oil.

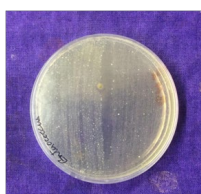
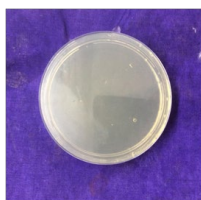


Figure 2. After action of cinnamon oil.



a root canal disinfectant in the field of endodontics.

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