

# REVIEW ARTICLE

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## INFLUENCE OF DIFFERENT VEHICLES ON THE ANTIBACTERIAL/ANTIMICROBIAL EFFECTS OF CALCIUM HYDROXIDE

M.R. Ganesh<sup>1</sup>, Shubhra Baranwal<sup>2</sup>, Nishtha Chauhan<sup>3</sup>

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**ABSTRACT:** This study was done to find out the influence of three different vehicles on the antimicrobial activity of calcium hydroxide against the four microorganisms commonly seen in the infected pulp of the root canals. For this study cell culture plates with solid media were used. The results of the study showed that all calcium hydroxide pastes were effective in killing the microorganisms tested but at different times. Amongst them only calcium hydroxide CMCP pastes and glycerin pastes were the most effective against the microorganisms tested.

**KEY WORDS:** calcium hydroxide, camphorated mono chlorophenol, glycerine.

**INTRODUCTION:** Successful endodontic therapy depends on three basic phases laid down in the field of endodontics namely diagnostic phase, preparatory phase and obturative phase. Disinfection of the root canal is obtained by the combined effect of biomechanical preparation, irrigation and intra canal medicament [6,7]. Some studies have reported that microorganisms may remain viable even after complete chemo-mechanical preparation and thus affects the result of root canal treatment. The use of intra canal medicament is commonly advised in the treatment of non vital teeth to control the growth of microorganisms in between visits and to prevent reinfection [2, 3]. Calcium hydroxide has been widely used as intra canal medicament because of its anti microbial action, ionic dissociation, high pH and enzyme inhibiting activity [8, 9, 10]. Studies have observed that calcium hydroxide is superior to CMCP in effectiveness against microorganisms and is not an irritant to the pulp and periapical tissues even if it remains in paste form for longer time. Sigueria showed that calcium hydroxide paste with saline solution was ineffective in eliminating *E. faecalis* even after 1 week of exposure; on the other hand calcium hydroxide/CMCP/ glycerin paste effectively killed microorganisms within 1 hour of exposure except for *E. faecalis* that required 24 hour of exposure. Calcium hydroxide mixed with distilled water, saline or glycerine has little or no antimicrobial effects [1]. Calcium hydroxide mixed with CMCP demonstrated pronounced antibacterial activity. Hence the aim of this study was to find out the influence of different vehicles on the antimicrobial effects of calcium hydroxide.

**MATERIALS AND METHOD:** Considering the microflora of infected root canal four bacterial strains were obtained namely *Staph aureus*, *pseudomonas aeruginosa*, *enterococcus faecalis*, and *streptococcus sanguis*. Calcium hydroxide powder was mixed with different vehicles such as normal saline, glycerin and CMCP- Glycerin. The ratio used in this study to prepare paste was 1:1 that is 1 gm calcium hydroxide powder with 1cc of appropriate liquid. Such prepared pastes were divided into different groups namely control (0.85% saline) group, calcium hydroxide- saline solution, calcium hydroxide-CMCP-glycerin and calcium hydroxide-glycerin. Four walls of 5mm diameter

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were cut on each solid media and a standard loop with an internal diameter of 4mm, which could deliver 0.01ml of the suspension of culture of test organisms, then spread across the culture plate. The walls were then filled with calcium hydroxide pastes and culture plates were then incubated at 37°C.

Growth and multiplication of microorganisms at the time intervals of 10 minutes, 1 hour, 1 day and 3 days were measured and the results observed.

**RESULT:** All the pastes were effective in killing the microorganisms tested but at different time. The calcium hydroxide/CMCP/ Glycerin paste was very effective against the microorganisms tested.

**DISCUSSION:** Calcium hydroxide is effective in eliminating the microorganisms from the infected root canals. It has bacteriocidal effect and has the capacity to neutralize the bacterial endotoxins. The antibacterial effectiveness of calcium hydroxide is related to its ionic dissociation creating alkaline environment [3]. However, time required to kill the microorganisms was different/similar when compared with other studies [4, 5]. Calcium hydroxide is bacteriostatic at lower concentration and bacteriocidal at higher concentration. Hydroxyl ion concentration is higher when the paste is applied and it's lower when diffuse to tissues. The present study shows that all the different calcium hydroxide pastes were effective in killing the microorganisms but required different time span. Amongst all calcium hydroxide/CMCP/ Glycerin paste rapidly killed the microorganisms. This indicates that CMCP enhanced the antibacterial effectiveness of calcium hydroxide paste. CMCP cannot be considered as a vehicle to calcium hydroxide due to its tissue irritating property, but only as an additional medication [7]. This study demonstrated that calcium hydroxide/CMCP/ Glycerin paste is found to be most effective anti-bacterial intra-canal medicament tested and its efficacy in vivo requires further investigation.

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### **AUTHORS:**

1. M.R. Ganesh
2. Shubhra Baranwal
3. Nishtha Chauhan

### **PARTICULARS OF CONTRIBUTORS:**

1. Reader, Department of Endodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh.
2. 2<sup>nd</sup> Year Student, Department of Conservative and Endodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh.
3. Final Year Student, Department of Conservative and Endodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh.

### **NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. M.R. Ganesh,  
CST, Back of G.P.O,  
Mumbai - 01.  
Email- watvrukshpippal909@gmail.com

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