

**How to Cite:**

Sawhny, A., Hora, B. S., Sumbria, S., Sharma, S., Sawhny, K., & Agarwal, S. (2022). Study of calcium hydroxide as an intra-canal medicament in endodontic treatment in chronic apical periodontitis: In vivo study. *International Journal of Health Sciences*, 6(S3), 9490–9494. <https://doi.org/10.53730/ijhs.v6nS3.8334>

## **Study of calcium hydroxide as an intra-canal medicament in endodontic treatment in chronic apical periodontitis: In vivo study**

**Dr. Asheesh Sawhny**

HOD & Prof, Dept of Conservative Dentistry & Endodontics, Rama Dental College & Hospital Centre, Kanpur, India  
Email: [drasheeshmydentist@gmail.com](mailto:drasheeshmydentist@gmail.com)

**Dr. Baljeet Singh Hora**

Prof, Dept of Conservative Dentistry & Endodontics, Rama Dental College & Hospital Centre, Kanpur, India  
Email: [drbaljeet69@yahoo.com](mailto:drbaljeet69@yahoo.com)

**Dr. Sumedha Sumbria**

Post Graduate Student, Dept of Conservative Dentistry & Endodontics, Rama Dental College & Hospital Centre, Kanpur, India  
\*Corresponding author email: [sumbriasumedha@gmail.com](mailto:sumbriasumedha@gmail.com)

**Dr. Saurabh Sharma**

Senior Lecturer, Prof, Dept of Conservative Dentistry & Endodontics, Rama Dental College & Hospital Centre, Kanpur, India  
Email: [saurabhsharmamds@gmail.com](mailto:saurabhsharmamds@gmail.com)

**Dr. Karuna Sawhny**

Reader, Dept of Orthodontics & Dentofacial Orthopaedics, Rama Dental College & Hospital Centre, Kanpur, India  
Email: [drkarunachib@yahoo.co.in](mailto:drkarunachib@yahoo.co.in)

**Dr. Saakshi Agarwal**

Post Graduate Student, Dept of Conservative Dentistry & Endodontics, Rama Dental College & Hospital Centre, Kanpur, India  
Email: [saakshi96agarwal@gmail.com](mailto:saakshi96agarwal@gmail.com)

**Abstract**--This study aims to determine the effectiveness of endodontic therapy with Ca(OH)<sub>2</sub> in cases with chronic apical periodontitis by measuring the microbial viability from root canal space in various phases of endodontic therapy. The microbiological calculations that have been presented have called forth an

establishment that  $\text{Ca(OH)}_2$  has excellent antimicrobial activity, provided its association with root canals is long-standing.

**Keywords**---calcium hydroxide,  $\text{Ca(OH)}_2$ , intra-canal medicament, endodontic microflora, chronic apical periodontitis.

## Introduction

This research was based on twenty teeth affected with chronic apical periodontitis. To isolate and recognize the microbes and their strains associated with chronic periapical process, biological specimens were taken from root canal space<sup>1</sup>. Assessment of antimicrobial activity & efficiency of  $\text{Ca(OH)}_2$  as dressing on endodontic microflora, in vivo the aim of this study. Prior to commencement of this study, informed consent of patients was taken.

## Material and Method

Microbiological calculations were accomplished as following: during the first session of therapy: before chemo- mechanical endodontic treatment, once it has been completed, and during the second session of therapy. Biological specimens were derived from root canal space, in this session, so that the microbial colonies that withstood the antibacterial effect of  $\text{Ca(OH)}_2$  could be accessed. The procedure of endodontic microflora sampling was: inserting a sterile paper cone into the root canal to a depth of 1-2 mm from the apex and keeping it there for 1-2 minutes. Samples that were bacteriologically positive were planted on customised solid environment, that were supplemented with growth factors. Samples were then incubated under anaerobic environment for 3-4days<sup>2</sup>. After the biomechanical therapy was done, the endodontic dressing of  $\text{Ca(OH)}_2$  paste (Metapex) was used during the initial therapy session. The endodontic access cavity was then sealed with a temporary restoration, Cavit, which prevented microleakage.<sup>3</sup>

The sample for the measurement of  $\text{Ca(OH)}_2$ 's antibacterial activity was done differently for the two groups of patients in the research: after 48 hours for the first half of the trial lot (10 patients) and after 10 days for the other half of the research lot (10 patients). It is widely recognized that  $\text{Ca(OH)}_2$  because of its high alkalinity has a bactericidal effect, however its effect is gradual and on long term.<sup>4</sup> Following about a week after intra-radicular insertion, the antibacterial action is noticeable, with maximal effectiveness after about ten to fourteen days.<sup>5,6</sup> As a result, we've taken two endodontic samples and assessed endodontic microflora: samples were taken at 48 hours for 10 teeth and at 10th day for the other half of the tested group (10 teeth). The bacteriological assessment has been confirmed on the grounds of structural and biochemical properties.

## Results

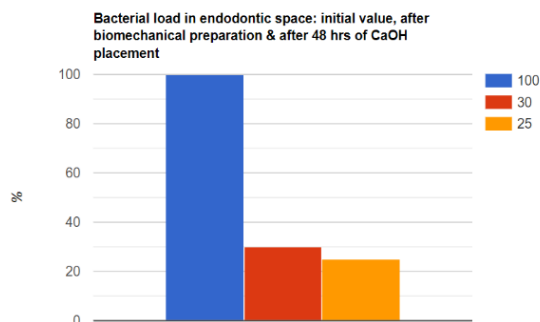
According to literature dates, all of the samples were originally positive for aerobic & anaerobic germs following the bacteriological diagnostic.<sup>7</sup> The following types of microbial strains were isolated: Peptostreptococcus tetradius, Veilonella parvula ,

*Actinomyces israelii*, *Eubacterium saburreum*, *Clostridium difficile*, *Fusobacterium nucleatum*, *Porphiromonas*, *Prevotella loescheii*, *Bacteroides* sp. cl. AU126. The following findings were achieved after antimicrobial treatment:

- The data obtained at 48 hours show that endodontic therapy was successful in removing 14 of the 20 bacteria species previously discovered. After 48 hours of endodontic Ca(OH)<sub>2</sub> antiseptic therapy, 5 strains were identified, representing 25% of the original value. A success rate of 16.67 percent during a 48-hour period demonstrates percentage.

Table 1  
Bacteria species initially identified, after biomechanical therapy and after 48-hours Ca(OH)<sub>2</sub> endodontic session

Species	Initial number	Percentage	Number after biomechanical treatment	Percentage	Number after Ca(OH) <sub>2</sub> treatment	Percentage
Peptostreptococ	2	10	1	5	1	5
Clostridium	4	20	1	5	1	5
Veilonella	1	5	-	-	-	-
Eubacterium	2	20	-	-	-	-
Fusobacterium	4	20	1	5	1	5
Prevotella	3	15	2	10	2	10
Bacteroides	1	5	-	-	-	-
Porphiromonas	3	15	1	5	-	-
Total	20	100	6	30	5	25



- The findings gained for the latter half of the Ca(OH)<sub>2</sub> group of patients, as well as the biological results at the tenth day, are as follows:
  - the number of microbial species that were originally isolated: 15
  - the number of species found was decreased to 5 after therapy and endodontic lavage with sodium hypochlorite.
  - Only one microbial species remained inside the endodontic space after a 10-day interval, accounting for 13.34 percent of the total. Ca(OH)<sub>2</sub> paste decreased the microbial virulence to 6.66 percent (because of biomechanical

treatment) from 33.31 percent in just ten days. So, in the tenth day,  $\text{Ca}(\text{OH})_2$  has an efficiency of 80%, according to this study.

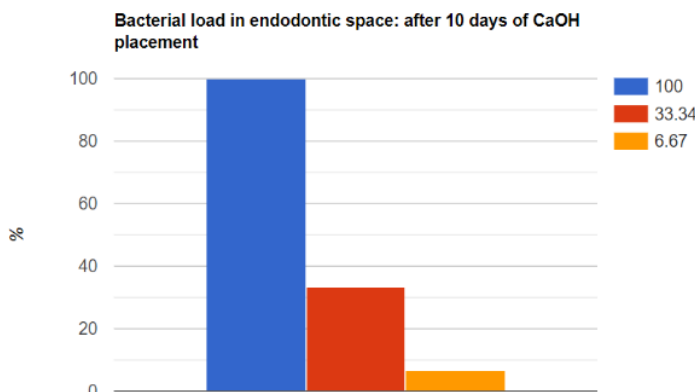


Table 2  
Bacteria species initially identified, after biomechanical therapy and after 10 days of  $\text{Ca}(\text{OH})_2$  endodontic session

Species	Initial number	Percentage	Number after biomechanical treatment	Percentage	Number after CaOH treatment	Percentage
Peptostreptococ	2	13.33	1	6.67	-	-
Clostridium	3	20	1	6.67	1	6.67
Eubacterium	1	6.67	-	-	-	-
Fusobacterium	3	20	1	6.67	-	-
Prevotella	2	13.33	1	6.67	-	-
Actinomycetes	4	26.67	1	6.67	-	-
Total	15	100	5	30	1	6.67

## Discussion

The findings of this investigation revealed 2 apparently contradictory characteristics of the bactericidal action on endodontic flora: when  $\text{Ca}(\text{OH})_2$  is inserted into the root canals for an extended period of time (ten days), it is remarkably powerful against endodontic bacteria, but it is ineffective after 48 hours. When calcium hydroxide is left in the root canal for at least a week, it is most effective. The majority of micro-organisms are almost eliminated during biomechanical preparation. The majority of bacteria that survive in the endodontic space after a successfully performed biomechanical therapy are found in the root system's ramifications, which are difficult to access to direct mechanical removal.<sup>10</sup> In chronic apical periodontitis, endodontic antiseptic therapy targets these microbes specifically.  $\text{Ca}(\text{OH})_2$  also has the ability of denaturing the proteins inside the root canal space, reducing their toxicity to the host organism. However, acting on leftover microbes in dentinal tubules from the root canal walls requires a length of time ranging from a week to a month.<sup>11</sup> Calcium hydroxide is, without a doubt, the most useful endodontic therapy in this regard.

**References**

1. Sakko M, Rautemaa Richardson R. Microbiology of Root Canal Infections. *Prim Dent J*. 2016 May 1;5(2):84- 89.
2. Ingle I. J., Rotstein I.: *Ingle's Endodontics*, 7th revised ed, PMPH-USA Limited, 2017.
3. S Dhull K, Das D, Samir PV, K Verma R Evaluation of Antimicrobial Efficacy of various Intracanal Medicaments in Primary Teeth: An in vivo Study. *Int J Clin Pediatr Dent*. 2017 Jul-Sep;10(3):267-271.
4. Zerella JA, Spangberg LS. Effectiveness of a Ca(OH)<sub>2</sub> and chlorhexidinediguconate mixture as disinfectant during retreatment of failed endodontic cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2005;100:756- 61.
5. I.M. Gheorghiu, *Microbiologia cariei dentare si a spatiului endodontic*. Editura Universitara Carol Davila, 2013.
6. Lakhani AA, Sekhar KS, Gupta P, Gupta A, Kashyap S, Desai V, Farista S. Efficacy of Triple Antibiotic Paste, Moxifloxacin, Ca(OH)<sub>2</sub> And 2% Chlorhexidine Gel In Elimination of E. Faecalis: An In vitro Study. *J Clin Diagn Res*. 2017 Jan;11(1):ZC06-ZC09.
7. Patil S, Dodwad PK, Patil AC, Singh B. Evaluation of antimicrobial efficacy of Ca(OH)<sub>2</sub> paste, chlorhexidine gel, and a combination of both as intracanal medicament: An in vivo comparative study. *J Conserv Dent*. 2013 Jan;16(1):65-70.
8. R U, Ramachandran R, Thomas V, Wood A. Insight into Oral Biofilm: Primary, Secondary and Residual Caries and Phyto-Challenged Solutions. *Open Dent J*. 2017 Jun 30;11:312-333.
9. Ercan E, Dalli M. Effect of intracanal medication with Ca(OH)<sub>2</sub> and 1% chlorhexidine in endodontic retreatment cases with periapical lesions: an in vivo study. *J Formos Med Assoc*. 2007 Mar;106(3):217-24
10. Chenicheri S, Ramachandran R, Thomas V. Insight into Oral Biofilm: Primary, Secondary and Residual Caries and Phyto-Challenged Solutions. *Open Dent J*. 2017 Jun 30;11:312-333.
11. Ercan E, Dalli M, Yaman F. Effect of intracanal medication with Ca(OH)<sub>2</sub> and 1% chlorhexidine in endodontic retreatment cases with periapical lesions: an in vivo study. *J Formos Med Assoc*. 2007 Mar;106(3):217-24.