INTRODUCTION

Microbial activities inside the dental plaque induce dental caries. If left untreated, it will progress to the pulp the dental pulp and surrounding periapical tissues and results in infection in respective sites. Apical periodontitis is a sequel of microbial infection of the pulp which results in inflammation of the periapical tissues. Bacteria are the most commonly found microorganisms in these infections but other species such as fungi, archea, and viruses have also been implicated. Among the bacteria Gram-positive and Gram-negative species are present with predominance of obligate anaerobes. The prognosis of root canal treatment depends on the reduction or elimination of bacteria present in an endodontic infection. This can be achieved by cleaning and shaping of the root canal system with mechanical instruments and irrigants. In addition, intracanal medicaments can also be used for the same purpose. Because of the complexity of root canal system some of the bacteria take refuge in ramifications, isthmuses, apical deltas and dentinal tubules even after chemomechanical preparation that needs to be eliminated by using intracanal medicaments. The remaining anaerobic bacteria in the root canal system often result in failure of root canal treatment. Thus, intracanal medication may be a significant value addition to chemo-mechanical preparation in the debridement of the root canal system and induction of repair in the periapical tissues.

Bacterial endotoxins are implicated in the periapical lesion. Calcium hydroxide is stated to detoxify lipopolysaccharides (which is one of these endotoxins). Calcium hydroxide is commonly used in endodontics for pulpotomy, direct and indirect pulp capping, apexification and apexogenesis, as an intracanal medicament in weeping canals, and for the treatment of internal and

OBJECTIVES: The objectives of this study were to evaluate the antibacterial effects of Calcium hydroxide and Chlorhexidene as intra canal medicaments in a sample of Pakistani population.

METHODOLOGY: Eighty, single rooted teeth of patients with necrotic pulps and periradicular lesion who presented at Department Of Operative Dentistry, Fatima Jinnah Dental College Hospital, Azam Basti were recruited in the study. At first appointment the root canals were cleaned, shaped and dried. Initial samples for bacteriological examination were taken. Medicaments to be tested were placed in the root canals and access cavities were sealed with temporary filling material. After seven days, samples were taken again from the root canal and inspected for growth of microorganism to determine the efficacy of the medicament used. Data was compared using Pearson's Chi-square test on S.P.S.S version 10 for windows.

RESULTS: Twenty three (57.5%) out of 40 cases with Chlorhexidene dressing yielded negative cultures. Whereas Calcium Hydroxide group showed negative cultures in 18 (45%) out of 40. There were no statistically significant differences between the two medicament groups. (p-value is 0.263).

Conclusions: Chlorhexidene has better antibacterial effects than calcium hydroxide clinically. However, there were no statistically significant differences among the medicaments tested.

KEY WORDS: Antibacterial effects, Calcium hydroxide, Chlorhexidene, Intra canal medicaments

IN VIVO STUDY OF ANTIBACTERIAL EFFECT OF CALCIUM HYDROXIDE AND CHLORHEXIDINE AS INTRACANAL MEDICAMENTS IN A SAMPLE OF PAKISTANI POPULATION

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external root resorption and perforation. Calcium hydroxide based root canal sealers are also available. According to Byström et al calcium hydroxide is effective in killing bacteria from the root canal system. The properties of Calcium hydroxide closely match the requirements of an ideal intracanal medicament mainly because of its alkaline pH. As it is alkaline in nature it destroys the bacterial cell membrane and protein structures hence it is bactericidal. It also neutralizes the acidic pH in the pulp remnants in the root canal space. Additionally, it also provides an alkaline state which promotes osteogenic activity in the surrounding periapical tissue through the continuous release of hydroxyl ions. However it does not totally prevent re-growth of the endodontic bacteria.

Chlorhexidene gluconate has evolved into an effective oral anti-microbial agent. It has been widely used for treatment of oral infections, periodontal infections and in caries prevention. Chlorhexidene consists of cationic molecule which binds to negatively charged bacterial cell walls, resulting in change in cell’s osmotic equilibrium. Furthermore, because of its cationic structure, Chlorhexidene has a unique property named substantivity (residual antimicrobial effect). In endodontics, it is used as an irrigant as well as an intracanal medicament. It has been proved that Chlorhexidene prevents the growth of bacteria commonly found in endodontic infections. Chlorhexidene is superior to iodine, potassium iodide and calcium hydroxide in its ability to remove Actinomyces israelii from infected dentinal tubules.

Enterococcus faecalis is a commonly detected microorganism in asymptomatic persistent endodontic infections. Chlorhexidine gluconate in combination with sodium hypochlorite is effective against E. faecalis. Antibacterial effects of these medicaments have been seen in other population but not in the Pakistani population. The purpose of this study is to see the antibacterial effects of these medicaments in a sample of Pakistani population. No local study relevant to this topic is known to the authors.

METHODOLOGY

This experimental study was conducted at FJDC. Eighty, single rooted teeth with necrotic pulps and radiographic evidence of periapical lesion were included in the study. Patients belonged to either gender and were of age 15 years and above. Teeth that had closed apices in which coronal seal was achievable were included in the study. Patients were excluded from the study if there was evidence of internal or external resorption, discharging sinus, root fractures, or if they were not restorable. Also, teeth with canals inaccessible to the apex, patients refusing to sign the informed consent, patients having systemic disorders such as diabetes, AIDS, and compromised immune system were excluded from the study.

Patients were selected by non probability consecutive sampling. Informed consent was taken. Rubber dam was applied for isolation of the tooth to avoid contamination of tooth and sample by oral flora. The root canals were cleaned and shaped at the first appointment using step down technique and irrigation with 5.25% sodium hypochlorite. Final irrigation was done with sterile saline solution. The samples were then taken with sterile paper points until all fluid from the root canals were absorbed. These samples were then transferred to Thioglycolate medium and inoculated at 37 degrees centigrade for seven days. The medium was inspected for growth of microorganisms, daily. After that intra-canal medicaments to be tested i.e Calcium hydroxide (Calciplupe of Septodent) and Chlorhexidene (Clinica gel of Platinum Pharmaceuticals) were placed in the canals according to the group and a sterile cotton pellet placed in the pulp chamber. The access cavities were sealed with Cavit (temporary filling material).

After seven days the root canal were irrigated with sterile saline solution. The sample was taken again by using the same procedure mentioned above. The medium was inspected for growth of microorganisms, daily. Results were recorded in proforma which is attached as 'Annex A'.

Data was statistically analyzed with SPSS version 10 using the Pearson Chi-square test.

RESULTS

The antibacterial effect of Calcium hydroxide and Chlorhexidene is shown in Table 1 & 2. Twenty three out of 40 cases (57.5%) having dressing with Chlorhexidine

<table>
<thead>
<tr>
<th>First Visit</th>
<th>Bacteriological Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of Teeth</td>
<td>Positive cultures</td>
</tr>
<tr>
<td>80</td>
<td>80 (100%)</td>
</tr>
</tbody>
</table>

Tabel 1: baseline microbiological examination:

<table>
<thead>
<tr>
<th>Second Visit</th>
<th>Bacteriological Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicament</td>
<td>Positive cultures</td>
</tr>
<tr>
<td>Ca(OH)2</td>
<td>22 (55.0%)</td>
</tr>
<tr>
<td>Chlorhexidine</td>
<td>17 (42.5%)</td>
</tr>
</tbody>
</table>

Tabel 2: Second visit results of microbiological examination
yielded negative cultures. Calcium hydroxide group showed negative cultures in 18 out of 40 cases (45%). There were no statistically significant differences between the two medicaments tested. (P value is 0.263).

The aim of endodontic treatment of teeth with pulp necrosis and periapical lesion is based upon the effective removal of microorganisms from the root canal system. Apart from chemomechanical preparation, intra canal medication has been observed to be a value addition in root canal disinfection. Our results reinforced this concept, because medicaments tested were effective in attaining negative cultures in cases that had positive cultures in the previous sampling.

Several substances have been recommended for intra canal medication. The results of our study have revealed that a higher percentage (57.3%) of cases with Chlorhexidine as intra canal medicament had negative bacterial growth, whereas in canals dressed with Calcium hydroxide relatively lesser percentage (45%) revealed no growth, in our sample. However, results were not statistically significant. These results are in agreement with most of other studies comparing Chlorhexidine and Calcium hydroxide as intra canal medicament.

The antibacterial effect of Chlorhexidine is probably due to its ability to be adsorbed on anionic substrate and be slowly released from these sites (substantivity), thus providing long standing antibacterial effects. The results of our study are in agreement with Barbosa et al who found that antimicrobial effects of Chlorhexidine were slightly better when compared with Camphorated Paramonochlorphenol and Calcium hydroxide. Basson et al claimed that persistence of anaerobic bacteria in the root canal system often leads to treatment failure which might be due to retention of microorganisms especially Actinomyces israelii in the dentinal tubules of root canal walls. That study showed that 2% Chlorhexidine is superior to iodine, potassium iodide and calcium hydroxide in its ability to reduce Actinomyces israelii from infected dentinal tubules. Gomes et al & Krithikadatta et al concluded that 2% Chlorhexidine gel alone was more effective against Enterococcus faecalis which is a resistant bacterium, than Calcium hydroxide (P <0.05).

The results of our study showed that out of 40 cases 22 (55.0%) dressed with Calcium hydroxide had positive cultures. These findings are in agreement with Peter et al and Balto who found that Calcium hydroxide limits but does not totally prevent regrowth of endodontic bacteria. This could be due to physicochemical properties of this substance that may limit its effectiveness in disinfecting the entire root canal system. In addition, Calcium hydroxide is not effective against all bacterial species found in root canal infections especially Enterococcus faecalis. Association of other medicaments may enhance the efficacy of the intracanal medication in eliminating residual bacteria in the root canal system.

**DISCUSSION**

Intracanal medications such as Chlorhexidine and Calcium hydroxide enhance root canal disinfection provided by chemomechanical preparation. When the two drugs were compared, Chlorhexidine had shown higher percentage (57.5%) of negative culture as compared to the Calcium hydroxide (45%). But the difference was not statistically significant (p-value 0.263).

**CONCLUSION**

**REFERENCES**


