Evaluation of antimicrobial efficacy of Omeprazole with Sodium hypochlorite against E. faecalis – An invitro study

Introduction:
The purpose of this in vitro study was to evaluate the antimicrobial efficacy of Omeprazole with Sodium hypochlorite against E. faecalis.

Methods:
30 extracted mandibular premolars were taken and their root canals were prepared till standardized No. 30 K file and the teeth were given to the microbiology laboratory for the formation of E. faecalis biofilms. The teeth were then randomly divided into 3 groups of 10 each. The teeth in the first group (control group) were irrigated with saline, in the second group were irrigated with 3% Sodium Hypochlorite and in the third group were irrigated with combination of 8.5% Omeprazole and 3% Sodium Hypochlorite.

Results:
Combination of 8.5% Omeprazole and 3% Sodium Hypochlorite was the most effective against E. faecalis followed by 3% Sodium Hypochlorite alone. The difference in the antimicrobial efficacy of the two groups was statistically significant.

Conclusion:
Proton pump inhibitors increase the efficacy of Sodium Hypochlorite against E. faecalis.

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Irrigation was accompanied using double side vented needle placed 1-2 mm short of the working length. A small amount of saline solution was introduced into the canal and an endodontic hand file as used in a filing motion to a level 1 mm short of root apex. Sterile 30 gauge needle was used to collect 0.01 ml f sample from the canal. Using a bacterial loop, the bacterial suspension was placed on BHI agar. The plates were incubated at 37° C for 24 hours and then number of colony forming units (CFUs) were counted.

**Results**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>414.00</td>
<td>138.20</td>
<td>58.00</td>
</tr>
<tr>
<td>SD</td>
<td>38.97</td>
<td>17.97</td>
<td>8.07</td>
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<tr>
<td>Group I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>P=0.0001*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group III</td>
<td>P=0.0001*</td>
<td>P=0.0001*</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.01

**Table 1: Pair wise comparison of three study groups (I, II, III) with respect to CFU counts by Newman-Keuls multiple posthoc procedures**

The irritant in Group 3 (8.5% Omeprazole +3% Sodium Hypochlorite) was the most effective against E. faecalis as the number of colony forming units were the least in Group 3 following irrigation. Group 2, 3% Sodium Hypochlorite alone also reduced the CFU as compared to the control group, however, the antibacterial efficacy of 3% Sodium Hypochlorite was further enhanced when it was combined with 8.5% Omeprazole (Group 3). The difference between each group was statistically significant.

**Discussion**

In the present study, it was decided to use 8.5% Omeprazole, the Proton Pump Inhibitor in combination with 3% Sodium Hypochlorite (NaOCL) and to compare its antimicrobial efficacy against E. faecalis with 3% Sodium Hypochlorite alone. The result of the present study showed that the combination of 3% Sodium Hypochlorite and 8.5% Omeprazole showed the maximum antibacterial efficacy against E. faecalis (Mean 414.00 and SD 38.97) followed by 3% Sodium Hypochlorite alone (Mean 138.20, SD 17.97). Therefore, in the present study, Omprazole increased the antibacterial efficacy of Sodium Hypochlorite against E. faecalis.

Sodium Hypochlorite has been most commonly used root canal irrigant used in Endodontics and several studies have shown that it is lethal to E. faecalis, yet it has been recovered very frequently from the failed root canal cases. E. faecalis is frequently associated with persistent endodontic infections as it possesses extraordinary ability to withstand adverse conditions and survive within the dentinal tubules as it secretes serine protease, gelatinase, and collagen binding protein which all help in dentin binding. It can also withstand prolonged periods of starvation and can utilize serum as a nutritional source which also helps it in dentin binding. Another reason attributed to its survival in root canal treated teeth is its ability to resist intracanal dressing of calcium hydroxide for over 10 days.

Proton pump inhibitors have been commonly used along with antibiotics for the treatment of peptic ulcers of microbial origin (Helicobacter pylori). Omprazole was the first PPI (Proton pump inhibitor) to be developed; it is a highly lipophilic weak base, which can easily cross the cell membrane. PPIs do not exhibit antimicrobial activity when used alone, but is reported to have a direct effect on the proton pump of certain bacterial species. PPIs not only reduce acid secretion but also increase the sensitivity to antimicrobials, maintaining the alkaline pH.

The values collected were analyzed using Kolmogorov-Sirnov Test, one way ANOVA and Newman-Keuls multiple posthoc procedures. Within the limitations of the study, it was concluded that Omprazole, the proton pump inhibitor increased the antibacterial efficacy of Sodium Hypochlorite against E. faecalis.

**REFERENCES**


