This study aimed to compare the antimicrobial efficacy of low-temperature atmospheric pressure plasma (LTAPP) design and gaseous ozone delivery system with 2.5% NaOCl on Enterococcus faecalis in root canal walls and dentine tubules. The samples were divided into LTAPP (n = 12), ozone (n = 12), NaOCl (positive control, n = 12) and saline (negative control, n = 6) groups. Microbial samples were collected using paper points and dentin chips from root canals. Antimicrobial efficacy was assessed by counting the colony-forming units of Ent. faecalis before and after each irrigation protocol. Data were analysed using Kruskal-Wallis, Wilcoxon signed-rank, Friedman and Bonferroni t (Dunn's test)-tests (P = 0.05). The microbial sampling with paper points showed antibacterial efficacy of NaOCl, LTAPP, ozone and saline in descending order, respectively (P < 0.05). The microbial sampling with dentin chips demonstrated a superior efficacy of LTAPP compared with NaOCl in the middle third (P < 0.05), while both had similar effects in coronal and apical thirds (P > 0.05). NaOCl and LTAPP were better than ozone at the coronal and middle parts of the root canals (P < 0.05). These findings led us to suggest that LTAPP, which has no thermal and chemical effects, may be of great aid in endodontic treatment.

SIGNIFICANCE AND IMPACT OF THE STUDY:

The present study handles different perspectives on chemomechanical preparation of root canals. Ozone and low-temperature atmospheric pressure plasma (LTAPP) were investigated to determine whether they could be an alternative for NaOCl. Up to now, chemical solutions (NaOCl, chlorhexidine digluconate, etc...) have been used to disinfect the root canals. When the reported effects of LTAPP on biological and chemical decontamination were taken into consideration, a question rose whether it has antimicrobial efficacy in root canals infected with E. faecalis. According to the findings of the present study, LTAPP may constitute a promising aid in endodontics in disinfection of root canals.