

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.