

ABSTRACT

Aim: The purpose of this *in vitro* study was to compare the smear layer removal efficacy and dentin erosion of three different irrigating solutions at different time intervals of the root canal under Scanning Electron Microscopy.

Materials and Methods: One hundred extracted human single straight rooted maxillary central incisors were taken and decoronated to standardize the canal length of 16 mm. They were instrumented by ProTaper NEXT rotary system to an apical preparation of file size X5. Prepared teeth were irrigated with 3ml of 3% NaOCl for 5min followed by final rinse of 2ml of 1% phytic acid (Group I), 18% Etidronic acid (Group II) and 17% EDTA (Group III) at 5min, 3min and 1min. The canals of teeth in Control (Group IV) did not receive the final irrigation. The teeth were sectioned longitudinally and prepared for an SEM evaluation. The dentinal wall of cervical, middle and apical thirds was graded according to the amount of smear layer remaining and dentin erosion on the root canal walls. The results were analysed using the Kruskal–Wallis and Mann Whitney U tests with significance set at $P < 0.05$.

Results: Intergroup comparison showed statistically **no significant difference** ($p=1.000$) in the smear layer removal efficacy of irrigants tested at 5min, 3min and 1min except for Etidronic acid(Group II) at 1min ($p=.000$). Control (Group IV) showed statistically **high significant** difference ($p=.000$) than other groups. Apical region of all groups showed statistically high significant difference ($p=.000$) than cervical and middle region. Intergroup comparison of dentin erosion showed EDTA (Group III) had high **erosion** values ($p=.000$) than other groups which are statistically significant. Phytic acid (Group I) showed **less erosion values** ($p=.000$) than other groups which are highly significant.

Conclusion: Phytic acid shows effective smear layer removal with less erosion of the root canal wall. Increasing the duration of irrigation does not improve the smear layer efficacy of irrigants except for Etidronic acid (Group II) but all groups showed more erosion at increased irrigation time. All the groups did not completely remove the smear layer at the apical region.

Keywords: Smear Layer, Dentin Erosion, Phytic Acid, Etidronic Acid, EDTA.