Evaluating the Effects of Cigarette Smoking and Heated Tobacco Products on Hard Dental Tissues

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Abstract

Objectives: This study aimed to evaluate and compare the impact of cigarette smoking (CS) and heated tobacco (HT) on the alteration of color and ultrastructural characteristics of human enamel and cementum.

Background: According to tobacco companies, a less harmful substitute for CS is HT products. Nevertheless, comprehensive research on the effects of HT on tooth structures has been lacking. This study aimed to evaluate and compare the impact of CS and HT on the alteration of color and ultrastructural characteristics of human enamel and cementum.

Materials and Methods: Thirty intact and non-carious human maxillary premolars extracted for orthodontic treatment purposes, previously disinfected, were used in the study. The specimens were randomly separated into six groups (n = 10), as follows: Group 1: enamel without smoking exposure; Group 2: enamel exposed to CS; Group 3: enamel exposed to HT; Group 4: cementum without smoking exposure; Group 5: cementum exposed to CS; and Group 6: cementum exposed to HT. The measurement of color change was conducted using a spectrophotometer. The surface alterations and mineral composition of enamel and cementum were evaluated using scanning electron microscopy and energy-dispersive X-ray spectroscopy. ANOVA test followed by Tukey's post hoc test was used to determine significant differences between groups.

Results: Results showed that CS had a more pronounced effect on enamel and cementum color changes than HT. The impact of CS and HT on color changes was more evident in cementum than in enamel. Surface morphology of enamel and cementum showed alterations in histology following exposure to both smoking types. Moreover, the mineral content experienced a significant reduction after using CS and HT. The reduction in calcium content after CS and HT exposure was similar. However, HT led to a significant decrease in the phosphorus content of enamel when compared with CS. At the same time, CS exposure in cementum resulted in a more significant reduction in Ca/P ratio than HT.

Conclusions: Although HT may appear to present a lower danger to hard dental tissues than CS, it is not entirely harmless. CS results in more color changes on the enamel and cementum of teeth. Both smoking methods affected the mineral content of teeth, with CS having a significant effect on the roots, while HT significantly affected the crowns' mineral composition.

Keywords

Cementum, cigarettes smoking, discoloration, enamel, heated tobacco, SEM.