Evaluating staining effects of cigarette smoke using Cigarette Smoke Simulation Chamber (CSSC) V1.0: An in vitro study

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Track: Youth and Students
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ABSTRACT

Introduction: Despite the increasing awareness of tobacco's detrimental effects, the impact of cigarette stains on dental health remains underexplored. Previous studies have inadequately modelled protocols for artificially staining tooth surfaces with cigarette smoke. This study aims to develop a chamber that can simulate cigarette smoking, allowing for a thorough investigation of its effects on enamel discolouration. By examining the in vitro discolouration of enamel samples, we seek to contribute to tobacco control among youth in terms of oral health and aesthetics. **Materials and Methods:** Enamel samples from permanent upper incisor teeth (N=5) were prepared using acrylic resin moulds. The specimens were subjected to aerosol exposure in a self- fabricated Cigarette Smoke Simulation Chamber (CSSC) V1.0 for 40 cycles, each lasting 15 minutes, using a total of 400 cigarettes to simulate one year of smoking. After each set of 10 cycles, samples were stored in distilled water at 37?C. Colour values were measured using a spectrophotometer at baseline and after exposure to cigarette smoke. Individual enamel sample colour readings (L*, a*, and b*) were recorded, and mean colour changes (ΔL*, Δa*, Δb*, and ΔE) were calculated. **Results:** Significant mean colour changes (ΔL*, Δa*, Δb*, and ΔE) were observed in each specimen after exposure to cigarette smoke. The mean ΔE values recorded were 23.43±0.02, 5.64±0.01, 9.44±0.32, 16.01±0.08, and 10.73±0.33, respectively. **Conclusion:** The Cigarette Smoke Simulation Chamberer (CSSC) V1.0 serves as an effective in vitro tool for evaluating the harmful effects of cigarette smoke on enamel surfaces. The significant discolouration after 1 year of smoking observed indicates the need for tobacco control measures, highlighting the effect of nicotine stains. This method has potential in research focused on dental health as well as for reducing tobacco-related harm among youth.

Keywords: Smoking Machine, Cigarette, Nicotine Stains, Enamel