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Nanoceramic Composite and Giomer With Finishing/Polishing Systems: Biofilm Formation

E. Dalkilic¹, S. Öztürk Yesilirmak², b. oglakci¹, z. özduyman¹, i. öztürk³, y. tekintas³, H. Dinç⁴, p. mayda⁴

¹restorative dentistry, bezmialem vakif university, Istanbul, Turkey, ²restorative dentistry, beykent university, Istanbul, Turkey, ³Pharmaceutical Microbiology, izmir katip celebi university, Istanbul, Turkey, ⁴medical microbiology, Uskudar university, Istanbul, Turkey

Objectives This in vitro study aimed to evaluate the effects of different finishing and polishing systems on the biofilm formation of a nanoceramic composite and giomer.

Methods Nanoceramic composite (Ceram-X Spherotec One, Dentsply Sirona) and giomer (Beautifill II, Shofu Inc.) were investigated. 120 disc-shaped specimens (diameter:4 mm, height: 2 mm) were prepared using teflon mold and divided into 6 groups according to the finishing and polishing system: 1) FP1: Mylar strip (control group), 2) FP2: diamond bur, 3) FP3: bur+multiple-step system consisted of OptiDisc (Kerr Corp), 4) FP4: bur+OptiDisc followed by Occlubrush (Kerr Corp), 5) FP5: bur+OptiDisc followed by Diapolisher diamond paste (GC Europe), 6) FP6: bur+OptiDisc followed by Enamel Plus Shiny paste (Micerium S.p.A). Bacterial biofilm structures were generated by adherent *Streptococcus mutans* on the test models (n=5). Then, the biofilm formation levels were detected spectrophotometrically at 620 nm after being stained by crystal violet for biofilm formation analyses. Scanning electron microscopy (SEM) was also used to evaluate the surface morphology and biofilm formation levels. Two-way ANOVA and Bonferoni tests were used for statistical analysis (p<0.05).

Results Regarding the finishing and polishing systems, for nanoceramic composite, the groups polished with polishing pastes (Group FP5 and Group FP6) showed significantly lower biofilm formation than Group FP2 (p<0.05). For giomer composite, Group FP4 and Group FP5 showed lower biofilm formation than Group FP2 (p<0.05). Regarding the restorative materials, for Group FP6, giomer showed significantly higher biofilm formation than nanoceramic composite (p<0.05). SEM revealed that lower biofilm formation levels were found on the surface of Group FP5 than Group FP2 for both of restorative materials. (Figure)

Conclusions The findings suggested the importance of selecting appropriate finishing and polishing techniques customized to specific materials to minimize biofilm accumulation.