ABSTRACT

AIM: To evaluate the surface topography of nanocomposite resin discs using Atomic Force Microscope (AFM) and the adherence of Streptococcus mutans biofilm on the surfaces after polishing using two different commercial polishing kits and indigenously prepared porous nanosilica abrasive.

MATERIALS AND METHODS: 60 nanocomposite resin discs were prepared and were standardized using a surface Profilometer. Samples were randomly divided into 4 groups. Group1- unpolished, Group2- polished with Sof-Lex system, Group3- polished with Super-Snap and Group4- polished with the indigenously prepared porous nanosilica abrasive slurry. Average surface roughness values (Ra) were measured using an Atomic Force Microscopy (AFM). Streptococcus mutans biofilm was allowed to form over the resin discs and the corresponding Optical Density (OD) values were measured using a UV-Spectrophotometer. The surfaces were cleaned off the biofilm and the surface topography changes were measured again using an AFM.

RESULTS: When analyzing the surface roughness values after polishing and Streptococcus mutans biofilm formation and the Optical Density of all the 4 groups, group 1 (unpolished) showed the highest values followed by group 3 (Super-snap) and group 2 (Sof-lex). Group 4 (porous nanosilica) showed the smoothest surface in AFM after polishing. Statistical analysis was done using one- way ANOVA and Tukey's post hoc tests which demonstrated a highly significant difference ($p<.001$) between the mean values of all the 4 groups.

CONCLUSION: Within the limitations of this in vitro study, it was concluded that the smoothest surface with least bacterial adherence was produced by porous nanosilica abrasive slurry when compared with the commercially available micropolishing systems- Sof-lex and Super-Snap. Biofilm produces the roughest surface on the unpolished group and porous nanosilica group showed the least changes in surface topography.

Keywords: Nanocomposite resin, Sof-Lex, Super-Snap, Porous nanosilica, Surface topography, Atomic Force Microscopy, Streptococcus mutans, Optical Density, UV-Spectrophotometer.