

TITANIUM SURFACE ROUGHNESS AFTER BRUSHING WITH ACTIVATED CHARCOAL TOOTHPASTE

Objectives: Grade 5 (Ti6Al4V) titanium alloy is widely used in dental abutment types. However, there are not enough studies about activated charcoal toothpaste effects on titanium surfaces although its increasing popularity. The aim of this study was to evaluate the effect of activated charcoal toothpaste usage on the surface roughness of Ti6Al4V.

Materials and Methods: Square shaped specimens (10×10×3mm) were prepared from medical Ti6Al4V alloy using guillotine cutting and the surfaces of them were finished with mirror-polished. Initial Ra values of the all specimens were measured by a contact profilometer. Then, specimens were divided into three groups (N=24, n=8): Unbrushed control group (Ti-C), brushed group with activated charcoal toothpaste (Ti-AC), brushed group with only distilled water (Ti-DW). Brushing simulation was performed using tooth brushing simulator (SD Mechatronic) with forward-backward motion in a linear distance of 5 mm, at speed of 25 mm/s, under 200g pressure for 10000 cycles to simulate 1-year of usage. The final roughness values of the specimens were measured after brushed. Data were statistically evaluated by paired t-test to evaluate before and after roughness changes in brushed groups and one-way ANOVA and post-hoc Tukey test to comparison all groups ($\alpha=.05$).

Results: Changes in surface roughness were statistically significant in both Ti-AC and Ti-DW group when compared before and after roughness values by paired t-test ($p=.011$ and $p=.004$, respectively). However, when compared independent groups, group Ti-AC and Group Ti-DW were found to be similar ($p=.350$), and when compared with group Ti-C, there was no statistical difference ($p>.164$).

Conclusion: Brushing the titanium surface with activated charcoal toothpaste does not produce more significant roughness changes than the effects of brushing itself. Therefore, it can be said that its short-term use will not cause negative effects. However, further studies are needed to recommend its long-term use.

Keywords: Activated charcoal; toothbrushing; titanium