EFFECT OF TOPICAL FLUORIDES ON THE SURFACE OF CAST TITANIUM AND NICKEL-CHROMIUM: AN IN VITRO STUDY

By

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Dissertation Submitted to the
Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore

In partial fulfillment
of the requirements for the degree of

MASTER OF DENTAL SURGERY (M.D.S.)

In

PROSTHODONTICS AND IMPLANTOLOGY

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DHARWAD

2007-2010

ABSTRACT

Background and objectives: Topical fluorides for prevention of dental decay are most widely used dental products at home and dental offices. Titanium, in spite of its protective oxide layer may be susceptible to localized or generalized attack by fluoride gels or solutions applied locally. Therefore this study was undertaken to evaluate the possible corrosion of cast Titanium and Nickel-Chromium surfaces when exposed to different concentrations and pH of fluoride gels and solutions.

Methodology: Seventy-eight rectangular wax patterns in equal dimensions were cast in Cp Grade II Titanium and Nickel-Chromium. These Titanium and Nickel-Chromium specimens were each divided into 3 groups of 13 samples each. Specimens in Group1, Group 2, Group 3 were placed in neutral Sodium Fluoride solution. Acidulated Phosphate Gel and distilled water respectively.

The surface roughnesses of the specimens were evaluated with Profilometer. SEM and EDS analysis further analyzed the surface of the specimens

Results: Statistical comparison of the mean and the standard deviation of the Titanium specimens in the three groups before (4.8777±0.5200) μm and after (6.7185±0.4067) μm surface treatment by one way ANOVA test, showed a significant difference in the surface roughness of the Titanium specimens of the three groups, with F-value (186.4009) and P-value (0.0000) at 5% level of significance. Duncan's multiple comparison test results further showed that the surface roughness values of

Titanium specimens in Group 2 differed significantly from that of Group 1 and Group 3 with their surface roughness at 5% level of significance.

SEM study revealed surface corrosion with deep corrosive pitting and granular forms of Titanium specimen of Group 2, whereas Nickel-Chromium specimen of Group 2 showed localized mild corrosive pitting with crystallized corrosion products. EDS analysis of Titanium specimen in Group 2 detected the presence of Sodium, suggesting deposits being present on the surface of the specimen after treatment with 1.23% APF gel.

Interpretation and conclusion: From the findings of the investigation and statistical comparison it was concluded that topical fluorides with acidic pH have an effect on the surface roughness of Titanium and also to a certain extent, on Nickel-Chromium. Therefore careful consideration must be given to the usage of these acidic fluoridated preparations in patients with these restorations. Neutral Sodium Fluoride solutions are found to cause no significant alterations in the corrosion resistance of Titanium or Nickel-Chromium, hence their usage is recommended

Key words: Cp Grade II Titanium; Nickel-Chromium; Topical fluorides; Profilometer; SEM; EDS.