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"EVALUATION OF VARYING CONCENTRATIONS OF NANO- OXIDES AS ULTRA VIOLET (UV) PROTECTIVE AGENTS WHEN INCORPORATED IN MAXILLOFACIAL SILICONES – AN IN VITRO STUDY"

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ABSTRACT

Objectives: The purpose of this study was to evaluate the degree of ultra violet (UV) protection after incorporating varying concentrations of nano- oxides in Cosmesil M511 medical grade extraoral silicone elastomer.

Methods: Nanosized oxides of Zn and Ti (group B and C), were added in various concentrations (0.5%, 1.0%, 1.5%, 2.0% and 2.5%, by weight) to a commercial silicone elastomer (Cosmesil M511), commonly used for fabricating extra oral maxillofacial prostheses. Cosmesil M511 silicone elastomer without nanosized oxides served as a control group (group A) for a total of 11 experimental groups consisting of 10 samples each. In each group of the study, all specimens were subjected to UV radiation exposure of wavelength 280-400nm inclusive of UV-A(>315–400 nm) and UV-B (>280–315 nm) and the percentage transmission was measured by a UV-Vis-NIR spectrophotometer. The ultra violet protection formula (UPF) was calculated based on the data obtained. The Shapiro Wilk test was used to check for normal distribution of data. Non-parametric tests like Kruskal-Wallis Test were performed to check whether there is a significant difference between the 11 groups where ($p< 0.05$) was considered significant. Mann-Whitney U test was used to check which of the groups differ significantly. Wilcoxon Signed Rank test was used to test the significant difference in values obtained for UV A and UV B range.

Results: UV- Vis Spectrophotometric analysis indicated that the percentage transmission (%T) values reduced considerably as the concentration of nano oxides were increased in case of Zn and Ti nano oxides for UVA and UVB ranges($P<0.05$). The groups containing nano oxides showed significantly increased UV shielding effect as compared to the control

group ($p< 0.01$). The least %T was observed in case of both Zn and Ti oxides in the UVB range($p<0.05$). The UPF values increased considerably as the percentage concentration of nano oxides were increased for both UV A and UV B range($p<0.05$).

Conclusion: Zn nano oxides offered significant and consistent results in lesser concentration(1%), as compared to Ti nano oxides(2 to 2.5%) in imparting the UV shielding property in Cosmesil M511 medical grade silicone elastomer.

Keywords: Maxillofacial silicones, nano oxides, UV shielding, UV –Vis Spectrophotometer.