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Evaluation of some mechanical properties of a new silicone material for maxillofacial prostheses after addition of intrinsic pigments

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Abstract

The average clinical life span of a silicone maxillofacial prosthesis is approximately 1.5 to 2 years, at which point it needs to be refabricated, mainly because of degradation of its mechanical properties. The purpose of this study was to evaluate tear strength, hardness, surface roughness, tensile strength and elongation percentage of VST-30 room temperature vulcanizing silicone for maxillofacial prostheses after addition of intrinsic pigments.

Two types of intrinsic pigments (rayon flocking and burnt sienna); each of them was incorporated into silicone in concentrations of 0.1 weight percentage for rayon flocking and 0.2 weight percentage for burnt sienna, which was determined in a pilot study. Mixing and curing of the material were done according to manufacturer's instructions and 120 samples were prepared and divided into 4 groups according to the conducted tests (tear strength, hardness, surface roughness, and tensile strength and elongation percentage) with 30 samples for each test. Each group was subdivided into A, B and C subgroups with 10 samples for each subgroup. Group A was without pigment (control group), group B was with rayon flocking and group C was with burnt sienna.

The results of this study showed that for samples with rayon flocking, there was a highly significant decrease in hardness (29.85) and there was a significant increase in tear strength (18.815 kN/m), but there were non-significant differences in surface roughness, tensile strength and elongation percentage (0.522 μm , 4.599 MPa and 892.8% respectively). Samples with burnt sienna showed a highly significant increase in tear strength (20.507 kN/m) and a highly significant decrease in hardness (30.14), but there were non-significant differences in surface roughness, tensile strength and elongation percentage (0.519 μm , 4.255 MPa and 863.6% respectively). However, there were non-significant differences between experimental groups in all tests.

In conclusion, this study showed that the addition of each of rayon flocking and burnt sienna changed the mechanical properties of the VST-30 silicone, while no superior pigment-silicone combination was demonstrated in all of the tests.