

**Ministry of Higher Education
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Evaluating the Role of Nano Yttrium Oxide Addition on Room Temperature Vulcanized Maxillofacial Silicone Elastomers Properties Before and After Aging

A Thesis

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Abstract

Background: Silicone elastomers are the mostly used material in maxillofacial prosthodontics, yet several properties deteriorate with time and usage rendering replacement of prostheses unavoidable (every 6-12 months). Yttrium oxide nanoparticles were added to cold and hot cure acrylic as reinforcers and proved improvement in some properties, so used in this study.

Aim of study: Evaluation the influence of adding Yttrium oxide nanoparticles (Y_2O_3) (30-45nm) to the maxillofacial silicone on tear strength, tensile strength and elongation percentage, hardness and surface roughness before and after 150 hours of accelerated artificial aging.

Materials and method: A total of 240 specimens were qualified, 120 specimens were tested before aging and the other 120 after 150 hours of aging. Each 120 specimens were divided into 3 groups (a control and two experimental groups), each group tested for (tear strength, tensile strength and elongation percentage, hardness and surface roughness).

Results: Before aging, there was highly significant increase in the tear strength and hardness, non significant increase in the tensile strength and surface roughness and non significant decrease in the elongation percentage. After aging, there was a decrease in the tear strength, tensile strength and elongation percentage and an increase in the hardness and surface roughness

Conclusion: Incorporating nano Y_2O_3 into maxillofacial silicone improved the tear strength, slightly increased the tensile strength. Surface roughness and hardness increased but within the accepted clinical range. After aging, the incorporation of nano Y_2O_3 increased the hardness and surface roughness; and caused a much less decrease in the tear strength, tensile strength and elongation percentage.