

**Ministry of Higher Education
and Scientific Research
University of Baghdad
College of Dentistry**



The effect of magnesium oxide (MgO) nano -fillers on the antibacterial activity and some properties of heat cured acrylic resin

A Thesis

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By

Dhualnoren Abdulkarem Shakir

B.D.S

Supervised by

Assisst.Prof. Shorouq Majid Abass

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ABSTRACT

Background: Poly(methylmethacrylate) is still far from fulfilling all the criteria of ideal denture base material and have several problems such as the susceptibility to microbial colonization, which is a crucial step for various oral infections. In addition to, unsatisfactory impact resistance, transverse strength and surface roughness.

Aim of the study: The purpose of this study was to investigate the effect of immersion heat cured acrylic in nanoscale MgO aqueous solution or incorporation of MgO nano fillers into acrylic resin on its antibacterial activity, impact strength, transverse strength and surface roughness.

Materials and Methods: Two techniques (immersion and incorporation) were used to introduce nanosized MgO powder to heat cured acrylic resin. In the microbiological part of this study, 40 specimens were prepared from heat cured acrylic resin to evaluate the antibacterial activity of 7% MgO NPs aqueous solution at two different immersion periods (10 and 30 minutes) and divided into 4 equal groups, 2 groups for each selected period. Impact strength, transverse strength and surface roughness were then evaluated to investigate the effect of MgO treatment (immersion and incorporation) on heat cured acrylic by the construction of 90 acrylic specimens, which were divided into three groups (30 specimens for each one): control group, immersion in 7% MgO NPs solution for 30 minutes before testing procedure. In addition to, the third group, which was prepared from the incorporation of 1.5% of unmodified MgO nano fillers into heat cured acrylic resin. Each one of these three groups was furtherly divided into 3 subgroups (10 specimens for each one) according to the test type.

Results: It was found that the immersion of acrylic specimens in 7% MgO NPs solution for different periods led to a highly significant reduction ($P < 0.05$) in

colony forming unites of *staphylococcus aureus* in comparison to control group. In addition, a non-significant difference ($P > 0.05$) in impact strength, transverse strength and surface roughness was obtained from 30 minutes immersion in that solution, while a highly significant difference ($P < 0.05$) resulted from the incorporation of 1.5% of unmodified MgO nano fillers when compared with control group.

Conclusions: Immersion in 7% MgO NPs solution was found to be effective in reducing the growth of *staphylococcus aureus* on acrylic dentures. Furthermore, it had no effect on the impact strength, transverse strength and surface roughness contrary to the incorporation of 1.5% of unmodified MgO nano fillers.