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THE EFFECT OF TWO AGING METHODS ON THE FLEXURAL STRENGTH AND CRYSTAL STRUCTURE OF YETTRIA STABILISED ZIRCONIA POLYCRYSTALS (IN VITRO STUDY)

Amr A Elsheemy
Alexandria University, Egypt

Introduction: Dental zirconia restorations present long-term clinical survival and be in service within the oral environment for many years. However, low temperature degradation could affect their mechanical properties and survival.

Objectives: Was to investigate the effect of two aging methods on the flexural strength and crystal structure of yttrium-stabilized zirconia (Y-TZP).

Material and methods: Thirty bar specimens were prepared from a yettria stabilized zirconia polycrystals and were divided into 3 groups (control, aged for 720,000 mechanical loads of 50N and 3600 thermal cycles, aged for 1 hour using autoclave). The aging procedures represent 3 years of clinical use. The specimens were loaded until fracture and the crystalline phase polymorphs of the material (tetragonal, t, and monoclinic, m, zirconia) were investigated by x-ray diffraction (XRD). Further investigations were done using scanning electron microscope (SEM). Data was statistically analysed using ANOVA test.

Results: Group B and C showed no statistical significance in their flexural strength with means of their break force (793.23±164.03) and (780.97 ± 257.25) respectively but statistically significant and higher than group A with mean (549.7 ± 54.14). The XRD showed nearly no change in the crystal structure between group A and B but an increase in the percent of monoclinic phase in group C. The SEM demonstrated a relatively homogenous size with particle size ranged between 400 to 570 µm for group A, while Group B and C showed an increase in particle size between 768 to 1150 µm respectively.

Conclusions: Both aging methods caused changes in the flexural strength and structure of the zirconia specimens with no significant difference between them.

Biography

Amr Elsheemy has completed his Msc at the age of 28 years from Alexandria University and is currently conducting his Phd studies at the same university. He is an assistant lecturer at the faculty of dentistry Alexandria university and a board member at Alexandria dental syndicate.

amr.elsheemy.1988@gmail.com