

## POSTER #20

### Effect of Water Storage on Physico-mechanical Properties of Dental Hybrid Ceramics

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**Introduction:** Dental hybrid ceramics have been developed to provide better mechanical properties, lower discoloration rates, and higher wear resistance than the conventional resin composites. They are currently available as monolithic blocks fabricated for CAD/CAM systems. However, little is known on their mechanical behaviours under simulated oral conditions.

**Objectives:** To analyse the surface topography of five CAD/CAM materials using scanning electron microscopy (SEM); to investigate and compare hardness obtained via nanoindentation and microindentation measurements; and to explore the changes of hardness and modulus subjected to aging.

**Materials & Methods:** 25 bar shaped specimens (12x4x2 mm) were prepared from five CAD/CAM blocks. The surface morphology of the tested ceramics was studied by SEM. Micro-hardness of the specimens was measured using Vicker indenter under a load of 100 gf for 10 s at room temperature. Nano-hardness was tested under 50 gf with a 10 s pause/dwell. After recording the baseline data, specimens were stored in distilled water at 37° C for 30 days before taking the 2<sup>nd</sup> measurements.

**Results:** The nano-hardness mean values of the studied materials ranged from 0.32 to 7.05 GPa. For the micro-hardness, the mean values ranged from 25.82 to 499.92 HV. Elastic modulus mean values ranged from 4.66 to 76.40 GPa. Statistically significant differences were found between the tested materials for all the studied mechanical properties. A statistical significant difference was also noticed before and after water storage for dental hybrid ceramic group. Positive correlations ( $r^2=0.56$ ) between the amount of ceramics and hardness values in both micro-hardness and nano-hardness data were noticed.

**Conclusions:** Different CAD/CAM materials show different surface morphology with fillers in different size, shape and density. Micro hardness and nano hardness of the studied materials increased systematically with an increase in filler loading. Mechanical properties of dental hybrid ceramic significantly decreased after 30 days of water storage.