

***Surface Deterioration Of New Silorane In
Comparison To Methacrylate-Based
Composite Materials After Simulated
Tooth-Brushing***

A thesis

**Submitted to the Council of Collage
of Dentistry University of Baghdad**

In Partial Fulfillment of the Requirements for

The Degree of Master of Science

In Conservative Dentistry

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April 2011

1432 جمادة الأولى

Abstract

This in vitro study was conducted to evaluate the effect of simulated tooth brushing / dentifrice on wear resistance, surface roughness and micro-hardness of the new novel low shrinkage silorane based posterior composite resin(SBC) FiltekP90 in comparison to two methacrylate based posterior composite resins(MBC); FiltekP60 a (Packable) composite resin and TetricEvoCeram a (nano-hybrid) composite resin.

Each type of composite was polymerized by conventional Quartz tungsten light curing unite (QD–UK) for 40 seconds ($450\text{Mw}/\text{cm}^2$) under celluloid matrix strip. A total number of (90) samples were prepared, (30) samples for each type of composite.

Each (10) samples from each composite type were water stored in 10ml de-ionized distilled water at room temperature (23 ± 1)°C for 2 weeks. Thereafter, (10) specimens from each composite type were measured for base-line weight (M1), surface roughness value and Vickers micro-hardness. Then all the samples were subjected to 20,000 cycles of simulated tooth brushing/dentifrice at room temperature (23 ± 1)°C. Thereafter, the weight difference (M1–M2) in grams, surface roughness value and Vickers hardness number for each sub-grouped samples were obtained.

One specimen from each tested composite type were subjected to pre and post-brushing Atomic Force Microscopic surface roughness analysis and topography.

Although results showed that there was no significant difference in abrasive wear and surface roughness between (SBC) and (MBC) resins, the (SBC) resin showed the minimum weight loss mean value and the lowest surface roughness mean value after simulated tooth brushing. Both (SBC) and (MBC) resins; showed increase in surface roughness value and

Vickers hardness number with high significant difference after simulated tooth brushing. The results obtained from Atomic Force Microscopy surface roughness analysis and topography was corresponding to those obtained from portable surface roughness tester.

The packable FiltekP60 (MBC) showed the highest micro-hardness value with high significant difference in comparison to FiltekP90 (SBC) and nano-hybrid TetricEvoCeram (MBC), while (SBC) showed higher micro-hardness value than nano-hybrid (MBC) with significant difference after 20,000 cycles of simulated tooth-brushing.

Pearson`s correlation test showed no correlation between wear and surface roughness neither between wear and micro-hardness, nor between surface roughness and micro-hardness.

The overall results revealed that FiltekP90 (SBC) showed comparable abrasive wear resistance and surface roughness to those of (MBC) resins after simulated tooth-brushing. Micro-hardness of all tested composite types in this study appeared to be material dependent and is influenced by filler type, size, loading and resin matrix composition.