

## Effect of Different Contamination on Microhardness of Resin Composite

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### Abstract

This study aims to evaluate the effect of contamination on surface microhardness of resin composite in comparison to resin composite without contamination group. Vickers microhardness was used to determine the effectiveness of polymerization on the contaminated surface of resin composite. Resin composite was filled into a disc-shaped metallic split mold (2 mm depth). Then, the resin composite specimens were contaminated by contaminants include a bonding agent, hemostatic agent, plumber tape, powdered gloves and alcohol then light cured for 40 seconds. Specimens were divided into 2 groups (unpolished and polished groups). Each specimen was tested by Vickers microhardness tester. The data were analyzed statistically by independent t-test and paired t-test using SPSS. The results revealed contamination by a bonding agent and plumber tape in unpolished groups was significantly lower than uncontaminated group ( $p < 0.05$ ). There were no significant differences between uncontaminated group and 5 contaminated in polished groups ( $p > 0.05$ ). The surface hardness of the polished specimens increased in 5 contaminated groups compared to the values from the uncontaminated group and all of the polished groups were significantly higher than the unpolished groups ( $p < 0.05$ ). In conclusion, contamination by a bonding agent and plumber tape were effect by the polymerization of resin composite. However, after the polishing procedure, the microhardness value of resin composite increased because the polishing procedure may have removed the incomplete polymerization layer caused by surface contamination.

**Keywords:** contamination, polymerization, resin composite, surface hardness, Vickers microhardness

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### 1. Introduction

Resin composites are used worldwide in dentistry, mainly because of their aesthetic quality and good physical properties. Since resin composite was first developed, many efforts have been made to improve the clinical behavior of this restorative material. Several studies have demonstrated that the surface hardness of resin composite depends on many parameters such as curing techniques, depth of cure, curing time, and polishing procedures. Some contamination such as water maybe inhibit polymerization reaction that effect surface hardness but no evidence about this issue (AlShaafi, 2017).

The polymerization reaction is one factor that effect surface hardness. Adequate polymerization all over composite resin restorations is one of the main important factors influencing their clinical success. The degree of conversion is an important tool to estimate the physical, mechanical and biological properties of composite resin restorations (Galvão, Caldas, Bagnato, de Souza Rastelli, & de Andrade, 2013; Cekic-Nagas, Egilmez, & Ergun, 2010). Higher degree of conversion is an essential factor for obtaining superior physical and mechanical properties (Cekic-Nagas et al., 2010; Yoon, Lee, Lim, & Kim, 2002). Inadequate polymerization might lead to marginal microleakage (Kusgoz et al., 2011), discoloration (Aguiar et al., 2011) and decreased bonding strength (Dalli'Magro et al., 2008) of resin composite restorations. The incomplete curing of composite resins is associated to a reduction in their mechanical properties and biocompatibility, increased content of residual monomers and altered clinical performance due to esthetic impairment, with high tendency to surface staining and the possibility of marginal leakage (Camargo, Moreschi, Baseggio, Cury, & Pascotto, 2009). A lower degree of conversion might also cause increase in the amount of released unreacted monomer, leading to less biocompatible restorations (Yap, Soh, Han, &