

Summary

Introduction: An adhesive bond between hard dental tissues and composite reconstructions is exposed to mechanical load, water, bacteria, enzymes and different chemical compounds. These factors could impair durability and resistance of composite reconstructions. In contrast with extensive research of negative influence of water on degradation of adhesive bonds, the influence of chemical substances on adhesive bond has not been investigated to a greater extent.

Aim: The aim of the experimental part of the thesis was to evaluate the influence of hydrogen peroxide containing tooth-whitening products and mouth rinses containing chlorhexidine and fluoride on a long-term stability of class V composite restorations created using four contemporary adhesive systems by a microleakage method.

Materials and methods: The following adhesive systems were investigated: total-etch Gluma Comfort Bond (GLU), and self-etch adhesives Clearfil SE Bond (CLF), Adper Prompt (ADP) and iBond (IBO). Standardized class V cavities were prepared in 192 extracted human teeth (one cervical margin in the cementum and one in the enamel). Subsequently, the cavities were restored using microhybride composite Charisma. The specimens were then exposed to the tooth whitening system Opalescence PF 20, mouth rinse Corsodyl containing chlorhexidine and mouth rinse Elmex containing aminfluoride. The exposure times were 2 and 6 months, the whitening system was applied in 25 cycles each 8 hours apart. The control group included restorations exposed to distilled water for 24 hours, 2 and 6 months. After the exposure the specimens were immersed in 2% methylene blue solution for 24 hours. The microleakage data were analyzed using Kruskal-Wallis, Mann-Whitney and Wilcoxon tests ($p=0.05$). The surface morphology was assessed using scanning electron microscopy.

Results: After being exposed to water, the specimens bonded by GLU a CLF showed a significantly lower microleakage score in both enamel and dentine. ADP and IBO showed a significantly higher microleakage, especially in the enamel. Compared to the control group, there were only small and statistically insignificant changes in the dentine and enamel microleakage. Differences were observed, when the samples were exposed to chlorhexidine- and fluoride-containing mouth rinses. Compared to the control group, there were statistically significantly lower microleakage scores, particularly for ADP and IBO.

Conclusions: The results suggest that the risk of impairment of the adhesive bond stability is higher in self-etch adhesive systems with simplified application procedures. The insignificant effect of the peroxide tooth whitening system and the unexpected increase in resistance of restorations exposed to mouth rinses inevitably lead to certain doubts about appropriateness of the recommended microleakage tests for systems with different bond to the enamel and dentin. Thus, it remains unclear if the tested products for oral hygiene really increased the adhesive bond resistance, or the observed effect resulted from the microleakage reduction due to precipitation of components of the exposure media.

Key words: microleakage, adhesive bond, adhesive systems, composite material, enamel dentin, corrosion environment