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Evaluation of wettability of pit and fissure sealants

Ana Eliza Durães de Faria*, Kelly Maria Silva Moreira, Regina Maria Puppin Rontani.

Abstract

The aim of this study were: to evaluate the effect of different glass surface (smooth-SS and rough-RS) on wettability of pit and fissure sealants with different compositions; to verify the effect of acid etching of bovine enamel on the wettability of sealants (ES - Etching surface and NS- no etching surface); and to analyze the effect of the sealant composition on the formation of sealant/enamel interface. The results showed that the material and surface influenced the wettability and regardless of the sealant, the enamel etching increases wettability and sealant adaption to enamel structure.

Key words:

Dental carie, pit and fissure sealant, wettability.

Introduction

Occlusal surfaces currently represent the majority of new dentition lesions in younger generations, post-fluoridation. According to the evidences the seal of the pits and fissures of those surfaces using sealants is an efficient method and one of the best strategies for prevention and progression of caries in general, since it facilitates the hygiene, preventing the development and accumulation of cariogenic biofilm¹.

The intimate bonding of the sealants to the enamel structure allows better adaptation to the surface with less possibility of infiltration and increased areas of biofilm accumulation. The sealing capacity of the resin sealants is influenced by variables related to the surface and characteristics of the material itself, such as viscosity, wettability and adhesion².

Therefore, the research objective was to evaluate the effect of the smooth and rough glass surface and bovine enamel acid etching on wettability of pit and fissure sealants with different compositions, and to evaluate the effect of addition of filler and other particles on the sealant/enamel bonding interface.

Results and Discussion

Smooth and rough glass slide and bovine teeth were prepared to evaluate the wettability degree, measured by the contact angle, of different sealants: Defense Chroma Angie® (Angelus, Brazil), Fluoroshield® (Dentsply, Germany) and Helioseal Clear® (Ivoclar Vivadent, USA). The evaluation of the effect of monomer composition and the presence of filler at the interface formed between sealant materials and etching enamel surface or not with 35% or 37% phosphoric acid was carried out under a scanning electron microscope. Wettability data were submitted to factorial ANOVA and Tukey's test ($p < 5\%$).

The results demonstrated there was a significant interaction between materials and surfaces ($p < 0.01$) for wettability to the surfaces of glass slide. Helioseal Clear® applied on the rough surface of the glass showed the greatest wettability. For the acid conditioning effect, there was no interaction between materials and surfaces ($p > 0.05$). However, there was influence of the material and surface in the wettability ($p < 0.01$). Helioseal Clear®

sealant and etching enamel surfaces showed a better wettability with lowest contact angle.

The difference in the composition of tested sealants is concerning to the presence or absence of filler particles, type of monomer type and amount. In addition to the sealant composition, the surface condition of the solid is an important determinant in the assessment of wettability³. The dissolution of the enamel by the acid conditioning creates microporosities, thus increasing the surface area available for bonding the material with the tooth, improving material flow.

In relation to the sealant/enamel interface, etched surfaces had a greater number of resin tags, independent of the sealant ($p < 0.0001$), which allow the interpenetration of the material with the mineralized tissues. For this reason, in etched surfaces, the applied material presented better adaptation.

Conclusions

Different sealants exhibit different wettability and the type of surface influences this property. Regardless of the sealant, the etching of enamel increases the wettability. The sealant/enamel interface was not influenced by the monomer composition and presence of filler in sealant, however, conditioned surfaces promoted better sealant adaptation to the enamel structure.

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