

University of Mosul
College of Dentistry



**Evaluation of Shear Bond Strength of
Pit and Fissure Sealant Applied by
Different Methods
(In Vitro Study)**

**A Thesis submitted by
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Abstract

Background: Pit and fissures on the teeth surface are more susceptible to dental caries because these faults contain accumulate food debris and remnants and are, therefore, more susceptible to the invasion of bacteria which are responsible for carious lesions. To overcome this and to prevent dental caries, pit and fissure sealant (PFS) is accomplished by the adherence of the material to the enamel surface which was acid etched previously, so it is physically obstructs the pit and fissure from the rest of the oral environment. **Aims of the study:** To evaluate and compare the shear bond strength of four different types of pit and fissure sealants (Conseal F, Fisseal, Charmseal and Smart seal) that adhere to the enamel and cured by halogen light cure machine or light emitting diode (LED), and to evaluate the use of bonding agent under these pit and fissure sealants. **Materials and methods:** This study is carried out by using 160 extracted upper first premolars extracted for orthodontic reason. The buccal surface was cleaned and polished. The teeth were randomly divided into 4 main groups of 40 teeth each, based on the pit and fissure sealant applied. Each group was subdivided into two subgroups of 20 teeth, depending upon whether bonding agent was used or not then each subgroups are divided into two subgroups of 10 teeth depending upon whether it is cured by Halogen light cure or by light emitted diode (LED). Each tooth in this study etched in the buccal surface with a 37% semi-gel phosphoric acid for 15 seconds, rinsed thoroughly for 15 sec, dried with air to obtain a uniformly white, dull, chalk-like appearance. Then etched surface was covered with a piece of insulating tape "adhesive tape" with a 3-mm-diameter circular hole. After that, (the samples that needed for applying boding agent) a layer of light cured bonding agent was carefully applied to the tooth surface light-cured for

10sec. then an -O-plastic ring was placed over the demarcated enamel site and carefully attached with adhesive tape, creating a cylindrical hole 3 mm in height and 3 mm in diameter that was corresponding with the demarcated enamel bonding site. The sealant was injected into the O-plastic ring, and cured for 40 seconds, half specimens cured with Halogen light cure unit machine and the other half cured with light emitted diode (LED). After curing, the sample was detached from the clamping device, and the -O-plastic ring was separated, forming a sealant cylinder (3 mm × 3 mm) adhering to the enamel surface. The samples were stored in artificial saliva until the time for the shear test. The shear bond strength was measured with the Unconfined Shear Testing Machine. The values of bond strengths obtained with megapascal (MPa). **Results:** The results showed that the Conseal F had the greatest shear bond strength followed by Fisseal and Charmseal. While the Smart seal had the lowest shear strengths. Also the results showed that curing by LED had a greater bonding strength than that by halogen machine for all groups. The use of bonding agent under pit and fissure sealant will give greater shear bond strength than that sample not used it and for all groups. **Conclusions:** Sufficient shear bond strength was produced for all pit and fissure sealants, and it is preferable to use LED and bonding agent during the application of pit and fissure sealant.