THE EFFECT OF TEMPERATURE VARIATION OF COMPOSITE ORTHODONTIC ADHESIVE ON SHEAR BOND STRENGTH

(A COMPARATIVE IN VITRO STUDY)

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Abstract

At the time of bonding of orthodontic attachments, the temperature of the adhesive can vary significantly from patient to patient, depending on the time period between the removal of the bonding kit from the refrigerator (4°C to 5°C) until it reaches room temperature (22°C to 25°C). Also, higher temperatures around 37°C can be reached at places close to ovens, under direct incidence of sunlight, clinical procedures in warmer areas or seasons or inside the patient mouth. These conditions may influence the chemical reactions and consequently interfere with bonding procedures, compromising the quality and durability of the bonding.

The purpose of this study was to assess the effect of temperature of the adhesive on the shear bond strength and failure site of orthodontic metal brackets bonded to enamel using ONE-STEP alpha-dent orthodontic composite adhesive system and Light Cure alpha-dent orthodontic composite adhesive system with halogen lamp curing unit.

Ninety sound extracted human upper first premolar teeth were selected and randomly divided into two equal groups, each with 45 teeth representing the type of the adhesive system (ONE-STEP and Light Cure). Then according to the temperature degree of the adhesive at bonding (24°C, 4°C and 37 °C) each group was subdivided into three equal subgroups each with 15 teeth.

After passing 24 hours of bonding procedure, the brackets were debonded by a Tinius-Olsen universal testing machine to measure the shear bond strength. After debonding each bracket base and the corresponding tooth surface were examined under a stereomicroscope and the Adhesive Remnant Index were recorded.

The results of the study showed that:

1. For ONE-STEP adhesive system, neither refrigeration (4°C) nor incubation (37 °C) resulted in a significant difference in the mean value of shear bond strength.

2. For Light Cure adhesive system, refrigeration (4°C) resulted in a significant increase in the mean value of shear bond strength, while incubation (37°C) had a non-significant effect.

3. Neither refrigeration (4°C) nor incubation (37 °C) had any significant effect on the failure site for both types of the adhesive system.

In conclusion, temperature variation affected Light Cure adhesive system more than No-Mix adhesive system.