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# **The Effect of Er:YAG laser surface treatment on shear bond strength and some mechanical properties of heat cure acrylic denture base material bonded to chair side soft lining material**

A Thesis

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# Abstract

**Background:** The soft lining materials play an important role in modern prosthodontics because of their capability to restore the inflamed and distorted mucosa. Despite its importance, the debonding from the acrylic denture base is one of the most clinical challenging issues in prosthodontics.

**Aims of the study:** To evaluate the effect of Er:YAG laser surface treatment on improving the shear bond strength between conventional heat cure acrylic and two types of chair side soft lining materials: (the silicone based soft liner material and an acrylic based soft liner material). Also to evaluate the effect of Er: YAG laser surface treatment on transverse strength and impact strength of conventional heat cure acrylic denture base.

**Materials and methods:** A total of 120 specimens of heat cure acrylic resin were prepared for this study. They were designed and divided according to type of the test. For the shear bond strength test type 80 specimens were prepared and divided into 2 major groups according to the type of soft lining material (40 specimens for each type of the relined material) and each major group was subdivided into 4 subgroups (10 specimens for each subgroup) and as follows: subgroup(1): without laser surface treatment (control). Subgroup (2): treated with Er: YAG laser. Subgroup (3): without laser surface treatment prepared for storage in artificial saliva for 14 days. Subgroup (4): treated with Er: YAG laser and stored in artificial saliva for 14 days. For the transverse strength test 20 specimens were prepared and again divided into 2 groups (10 specimens for each group). The first group was untreated group (control group) and the other was treated with Er: YAG laser. For the impact strength test 20 specimens were prepared and divided into 2 groups (10 specimens for each group). The first group was untreated group (control group) and the other was treated with Er: YAG laser.

**Results:** the results revealed that the higher mean value of shear bond strength ( $1.11 \text{ N/mm}^2$ ) was appeared in cold cure silicone based soft liner when immersed in distilled water for 24 hours, while the results of shear bond strength of the same specimen immersed in artificial saliva for 14 days ( $1.10 \text{ N/mm}^2$ ) showed statistically non significant differences.

The results revealed that the higher mean value of shear bond strength ( $0.094 \text{ N/mm}^2$ ) was appeared in cold cure acrylic based soft liner when immersed in distilled water for 24 hours, also the higher mean value of shear bond strength ( $0.105 \text{ N/mm}^2$ ) of the same specimen when immersed in artificial saliva for 14 days was appeared.

Regarding the results of transverse strength and impact strength of heat cured acrylic resin, the results revealed that there was non significant differences as compared with control.

**Conclusion:** within the limitations of this study, Er: YAG laser surface treatment of the heat cure acrylic denture resin before application of resilient lining material (acrylic based or silicone based soft liner) resulted in highly significantly increased in shear bond strength values than seen in untreated control specimens. The Er:YAG laser has no effect on transvers and impact strength of the heat cure acrylic resin.

**Key word:** Er:YAG laser, Soft liner material, Heat cure acrylic, Shear bond strength.