



**Republic of Iraq**  
**Ministry of Higher Education**  
**And Scientific Research**  
**University of Baghdad**  
**College of Dentistry**



**EFFECT OF THERMOCYCLING ON THE BONDING  
STRENGTH OF ACRYLIC SOFT LINER TO THE  
SURFACE OF THERMOPLASTIC ACRYLIC RESIN  
TREATED WITH ETHYL ACETATE**

A Thesis

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Baghdad in Partial Fulfillment of the Requirement for the Degree of Master of  
Science in Prosthetic Dentistry

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## ABSTRACT

**Background:** Soft lining materials play an important role in modern prosthodontics treatment because of their capability to restore the inflamed and distorted mucosa. It is commonly agreed that the main drawback of commercially available heat-cured acrylic based soft lining material is the poor bonding to denture base. Therefore, there is a need for enhancing the strength of bonding of these materials.

**Aim of the study:** This study was conducted to assess the influence of ethyl acetate surface treatment on the surface roughness ,shear bonding strength and microleakage of thermoplastic acrylic denture base material to the acrylic-based heat processed soft liner.

**Materials and methods:** Twenty Samples of injection molded thermoplastic acrylic denture base were fabricated to assess the influence of surface treatment with ethyl acetate on the surface roughness. Injection molded thermoplastic acrylic and heat cured acrylic soft liner was used to fabricate sixty samples used for shear bond testing. According to the number of thermal cycles, thermoplastic acrylic samples were segmented into three groups and these groups were segmented into two subgroups of ten samples depending on the surface treatment with ethyl acetate. The first group was tested for shear bond strengths without thermal cycling while the other two groups were thermocycled for 1500 cycles and 3000 cycles in water before testing. Failure type was assessed visually. Forty samples of injection molded thermoplastic acrylic and heat cured acrylic based soft liner were constructed for microleakage testing. The first group consisted of twenty samples, the first ten samples were fabricated without ethyl acetate surface treatment and the other ten samples were surface treated with the solvent (ethyl acetate). Samples were then thermocycled for (1500) times and tested. The second group consisted of twenty samples

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and subdivided and prepared the same way as the first group and thermocycled for (3000) times before testing. Modifications of thermoplastic acrylic denture base surface preparation were investigated by using scanning electron microscope. AFM analysis was used to evaluate the surface topography of thermoplastic acrylic following surface treatment. FTIR was used to detect whether there was a chemical bond between thermoplastic acrylic material and the organic solvent.

**Results:** Highly significant increase in surface roughness mean values of surface treated thermoplastic acrylic denture base material in comparison to the untreated group was detected. Shear bond strength between thermoplastic acrylic denture base material and heat processed acrylic soft liner was significantly higher following ethyl acetate surface treatment of thermoplastic acrylic denture base material. Highly significant decrease in Microleakage between thermoplastic acrylic denture base and heat processed acrylic soft liner following surface treatment of thermoplastic acrylic denture base material was also detected.

**Conclusion:** Surface treatment of thermoplastic acrylic denture base material has improved the bonding strength of denture base material to the acrylic-based heat processed soft liner. This treatment also decreased the microleakage between denture base and soft lining material. Thermocycling for 3000 and 1500 times has a deleterious effect on the bonding strength and increasing microleakage which negatively affect dental prosthesis serviceability.



جمهورية العراق  
وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
كلية طب الأسنان



## تأثير التدوير الحراري على قوة الترابط بين المادة المبطننة اللينة الاكريلكية و سطح الراتنج الاكريلكي البلاستيك الحراري بعد معالجته بخلات الاثيل

رسالة

مقدمة الى مجلس كلية طب الاسنان /جامعة بغداد  
كجزء من متطلبات نيل درجة الماجستير في التعويضات الاصطناعية

من قبل

ضحى قيس صباح

بكالوريوس طب وجراحة الفم والاسنان

بإشراف

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ماجستير في التعويضات الاصطناعية