



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



**EFFICACY OF VARNISHES WITH: BIOACTIVE  
GLASS, RECALDENT TECHNOLOGY AND  
SILVER DIAMINE FLUORIDE IN COMPARISON  
WITH SODIUM FLUORIDE ON TOOTH SURFACE  
STRUCTURE (AN IN VITRO STUDY)**

A thesis submitted to the council of the College of Dentistry / University of  
Baghdad in partial fulfillment of the requirement for the degree of *Master  
of Science in Pediatric Dentistry*

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## ABSTRACT

**Introduction:** Dental caries is the most worldwide public health problem which occur due to demineralization process and affect the teeth surface characteristics as hardness and roughness. In the early phase of caries process, this effect could be reversed by variety of remineralizing agents in which the calcium and phosphate ions from external sources are deposit on the demineralized crystals to restore some of the lost minerals. Measuring the tooth surface hardness, roughness, and lesion depth could give a clear idea about the tooth surface status and efficacy of the used remineralizing agents. The aim of the study was to study and compare the efficacy of various remineralizing agents (varnishes) on the teeth surface micro-hardness, roughness, and microscopic evaluation.

**Materials and Methods:** In this study, 57 sound maxillary deciduous canine were used, 7 teeth for the microscopic evaluation by Polarized Light Microscope (PLM), while 50 teeth were distributed into 5 groups according to the varnish used (10 teeth in each group) for both micro-hardness test by Vickers micro-hardness tester device and roughness test by Profilometer surface roughness tester device at 3 times measurement intervals: baseline, demineralization (after immersing for 72 hours in the demineralizing solution), and remineralization stage (after 2 weeks of treatment application). The groups according to the remineralizing varnishes used were: 1-Silver Diamine Fluoride (SDF), 2-Bioactive Glass (BAG), 3-Casein Phosphopeptide Amorphous Calcium Phosphate (CPP-ACP) that known as Recaldent technology, and 4-Sodium Fluoride (5% NaF). The last group (5<sup>th</sup> group) was Control which preserved in artificial saliva without any varnish.

**Results:** The results revealed that, compared to the control group; there was a significant increase in the surface micro-hardness in the groups treated with Bioactive Glass, and Casein Phosphopeptide-Amorphous Calcium Phosphate, followed by Silver Diamine Fluoride. A significant decrease in the surface roughness was noticed in the groups treated with Casein Phosphopeptide-Amorphous Calcium Phosphate followed by both Sodium Fluoride and Bioactive Glass groups, with insignificant effect in Silver Diamine Fluoride group.

**Conclusions:** Based on the outcomes of the present study, all of remineralizing agents that had been used had an efficacious effect on the tooth remineralization. The enhancement of teeth surface micro-hardness was obvious in both Bioactive Glass, and Casein Phosphopeptide-Amorphous Calcium Phosphate groups, while Sodium Fluoride group showed better effect than artificial saliva, but the least efficiency comparing to the others. Casein Phosphopeptide-Amorphous Calcium Phosphate was the most efficacious varnish of the types used in the present study in decreasing the roughness of the demineralized tooth surface and restoring of the enamel surface smooth texture with an obvious effect, followed by the groups treated with Sodium Fluoride and Bioactive Glass.



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



## فعالية الورنيشات المحتوية على: الزجاج النشط بيولوجياً ، وتكنولوجيا إعادة التسرب و ديامين فلوريد الفضة بالمقارنة مع فلوريد الصوديوم على هيكل سطح الأسنان (دراسة مختبرية)

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من قبل

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