

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



**Evaluation The Effect of Mixing and Activating  
Methods on Microleakage of Different Glass  
Ionomer Restorative Materials in Primary Molars  
(An in vitro study)**

A thesis

Submitted to the council of the College of Dentistry at the  
University of Baghdad, in partial fulfillment of requirements  
for the Degree of Master Science in Preventive Dentistry

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Preventive Dentistry

2021 A.D

1442 A.H

## **Abstract**

### **Background:**

The degree of shrinkage and microleakage of glass ionomer restorative materials considered as a critical factor for the durable success of these materials. In order to reduce the microleakage, several strategies were adopted such as reducing the polymerization shrinkage by the use of different chemical composition of glass ionomer cement such as utilizing multiple-sized filler particles, use different mixing types, different activation types, or putting coat after finish the restoration.

**Aim:** The aim of this study was to assess and compare the effect of the microleakage between capsulated and non-capsulated conventional glass ionomer cement, capsulated and non-capsulated resin- modified glass ionomer cement and capsulated hybrid glass ionomer cement in primary molars.

**Materials and Methods:** A total sample of 60 primary molars were divided into five groups. Two groups restored with hand-mixed chemical activated conventional (Fuji IX-non capsulated) and light curing activated resin modified glass ionomer restoration (Fuji II LC-non capsulated). Another two groups restored with capsulated chemical activated conventional (Fuji IX-capsulated) and with capsulated light curing activated resin modified glass ionomer restoration (Fuji II LC-capsulated). The fifth group was restored by hybrid glass ionomer cement (Equia forte). Microleakage was tested by immersing the teeth in 2% methylene blue dye penetration for 24 hours after coat by two layers of nail varnish then the thermocycler in water bath 500 cycles temperatures at 5 °C and 55 °C to simulate the thermal changes occurred in the oral environment. and molding in epoxy resin to facilitated to cut longitudinally by microtome device measured at x20 magnification under the stereomicroscope, use two methods to

test first by score test and second by using software to measure the dye penetration between the glass ionomer filling and the tooth in millimeter.

**Results:** The results of this study showed that the highest microleakage was found in the non-capsulated of conventional glass ionomer cement (Fuji IX) followed by the non- capsulated resin modified glass ionomer cement (Fuji II) then the capsulated of conventional glass ionomer cement (Fuji IX) and the capsulated resin modified glass ionomer cement (Fuji II) while the least was found in the hybrid glass ionomer cement (EQUIA FORTE) with significant difference between cements. Also showed that coating with nano-coating showed a reduction in microleakage in hybrid glass ionomer (Equia Forte) and more microleakage in non-coating resin modified glass ionomer cement (Fuji II) and also more microleakage in coating conventional glass ionomer cement (Fuji IX).

**Conclusion:** The capsulated type for all type of glass ionomer that less microleakage than hand mix type, also the coating give improve to conventional glass ionomer make it same degree with resin modified glass ionomer and give less microleakage to hybrid glass ionomer than all types.



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

**تقييم تأثير طرق الخلط والتفعيل على التسرب المجهرى للمواد  
الترميمية للشاردة الزجاجية المختلفة في الأضراس البنية  
(دراسة في المختبر)**

رسالة مقدمة الى مجلس كلية طب الاسنان في جامعة بغداد كجزء من متطلبات  
نيل شهادة الماجستير في طب الاسنان الوقائي

قدمت من قبل  
**صهيب قيس علوان**  
بكالوريوس طب وجراحة الفم والأسنان

بإشراف  
**الاستاذة الدكتورة عذراء مصطفى الوهب**

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