



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



**SHEAR BOND STRENGTH AND MORPHOLOGY
OF SOUND AND CARIES-AFFECTED DENTINE
SURFACES BONDED TO TWO RESIN-MODIFIED
GLASS-IONOMER CEMENTS (AN IN- VITRO
STUDY)**

This thesis is submitted to the council of the College of Dentistry/
University of Baghdad in partial fulfilment of the requirement for the
degree of Master Science in Conservative Dentistry

By

Ruaa Muteb Mohammed

B.D.S

Supervised by

Assist. Prof. Dr. Lamis A. Al-Tae

B.D.S., M.Sc., PhD

2021A.D.

1443 A.H.

ABSTRACT

Background: ACTIVA BioACTIVE restorative is a self-adhesive resin modified glass ionomer cement with a hydrophilic ionic resin matrix that improves its resilience and facilitates the diffusion of active ions with a potential chemical bonding ability to healthy and diseased tooth tissues, which is relevant in the minimal invasive dentistry. The aim of this study was to investigate the material's bonding efficacy and assess the interfacial morphology of debonded sound and carious dentine surfaces immediately and post two-months of storage in simulated body fluid (SBF) at 37°C.

Materials and Methods: Sixty-four permanent mandibular 1st molars, sound and those with natural occlusal caries containing caries-affected dentine (CAD), following the International Caries Detection and Assessment System (ICDAS), score 4, were collected (n=32 per substrate) and hemi-sectioned longitudinally. The buccal half of each tooth was embedded in acrylic resin block exposing the dentine surface. Each prepared substrate (sound and CAD) was conditioned with 10% polyacrylic acid for 20 seconds followed by the application of ActivaTM BioActive (Pulpdent Corp., USA) and Fuji II LC (GC Corp. Japan) per the manufacturers' instructions. Shear bond strength (SBS) was performed after 24 h and 2 months of storage in SBF. The debonded surfaces were examined via digital microscope (50x) to determine the mode of failure, followed by scanning electron microscope (SEM) examination to analyse the ultra-morphology of these substrates (30 x, 500 x, 2500 x). Data were analysed statistically using three-way ANOVA and Bonferroni post-hoc tests were employed to calculate the significant factors (alpha level=0.05) in SBS values among tested groups. Pairwise comparison test was used (p<0.05) to determine the effect of storage time on the SBS of each material per substrate and the difference between substrates.

Results: The results showed that Activa exhibited lower SBS to sound and CAD than F2LC immediately and post-ageing ($p=0.000$). There was a pronounced improvement in SBS of F2LC to CAD ($p=0.000$) over time, with no statistically significant effect of ageing on sound dentine ($p=0.309$). In contrast, Activa showed stable SBS to sound and CAD immediately and post-ageing ($p>0.05$). However, the presence of minerals-like deposits observed by SEM attached to the aged debonded dentine surfaces obliterating the exposed dentinal tubules might support the potential ability of Activa Bioactive for tissue repair.

Conclusions: it can be concluded that the bond strength of Activa to sound and CAD was lower than F2LC, but the bond stability and sealing ability might be beneficial in minimal invasive treatment with a suggestion to be overlaid by a resin composite coverage when used in stress bearing areas.



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



قوة الترابط القصي و التغيرات السطحية لعاج الأسنان السليمة والمتأثرة بالتسوس بعد ارتباطها بمادتين من الإسمنت الزجاجي الأيوني المعدل بالراتنج (دراسة مختبرية)

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

من قبل

رؤى متعب محمد

بكالوريوس في طب وجراحة الفم والاسنان

باشراف

أ.م.د. لميس عبد الحميد الطائي

بكالوريوس في طب وجراحة الفم والاسنان

ماجستير في معالجة الاسنان

دكتوراه في معالجة الاسنان