

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



**Evaluating the Effect of Air Abrasive Polishing on Friction and
Surface Micromorphology of Ceramic Brackets Using Different
Wires (An in vitro study)**

A Thesis

**Submitted to the Council of the College of Dentistry,
University of Baghdad in Partial Fulfillment of Requirements
for the Degree of Master of Science in Orthodontics**

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2020 A.D.

1442 A.H.

Abstract

Fixed orthodontic appliances increase the risk of caries. Since many patients are unwilling or unable to conduct adequate teeth cleaning, professional cleaning is often essential. Air abrasive polishing offers the advantage to remove in a short time deposits in hard to reach places.

The aim of the present study was to evaluate the in vitro state of air abrasive polishing on frictional resistance and surface micromorphology of mono crystalline ceramic (sapphire) brackets.

One commercial brand of sapphire brackets (Perfect Clear, Hubit Co.) were evaluated. The specimens were randomly divided into sixteen groups each group with five specimens who classified according to commercial brand of the arch wire and air abrasive time (0, 5, 10 and 20 seconds).

The air abrasion was performed with an NSK airflow appliance using sodium bicarbonate powder. Universal testing machine was used to simulate the movement of retraction in sliding mechanics, measuring the traction force needed to slide 10 mm of 0.018 inches {conventional stainless-steel , fiber-reinforced polymer composite, tooth tone coated (epoxy coated) stainless steel and rhodium-coated stainless-steel} arch wires over the test specimen brackets.

The surface micromorphology of one sample from each group was examined by Scanning electron microscope. The data were analyzed by ANOVA and HSD tests.

Sodium bicarbonate air abrasive polishing on the sapphire brackets caused a statistically very high significant increase in friction for four types of arch wire in relation with abrasion time. But, it caused a high significant increase in friction of sapphire brackets with rhodium-coated stainless-steel when comparing between and within the groups.

Scanning electron microscope showed that air abrasive polishing did not cause any noticeable alterations in the surface micromorphology of sapphire

brackets except the retention of these abrasive particles on its porous and irregular surface.

In conclusion, sodium bicarbonate air abrasive polishing should be used with caution on sapphire brackets. However, it can be used with minimal adverse effects on sapphire brackets which need prophylaxis most because of their transparent nature; but abundant washing with water must be performed to remove the residue retained in their irregular porous surface.