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College of Dentistry**



**Effects of air abrasive polishing on ion  
release and corrosion of different self-  
ligating orthodontic brackets  
(An in vitro study)**

**A Thesis**

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# Abstract

Orthodontic treatment with has been increasingly demanded. However, treatment with fixed orthodontic appliances compromises the oral hygiene and increases the risk of plaque related disorders and dental staining in addition to corrosion related issues. Air abrasive polishing had a superior effect over the conventional method in removing dental deposits however, its effect on corrosion process was not investigated thoroughly in details. This study designed to assess the effects of air polishing on ion release and surface micromorphology of stainless steel self-ligating brackets.

Three hundred and twenty self-ligating stainless-steel brackets of four brands, Damon<sup>®</sup> Q<sup>™</sup>, Discovery<sup>®</sup> SL 2.0, Leone<sup>®</sup> F1000, Lotus Plus<sup>®</sup> were exposed to different time of air abrasion polishing (0, 5, 10, 20 seconds) and immersed in artificial saliva with two different pH values (6.75 and 3.5); incubated at 37°C for 28 days. Ni, Cr and Fe ions were assessed using atomic absorption spectrophotometer at 7, 14 and 28 days. Atomic force microscope and scanning electron microscope were used to assess the surface changes and microtopography. Analysis of variance test (ANOVA), and Tukey's (HSD) test were used to identify the significant difference among the studied groups where the level of significance set at  $P \leq 0.05$ .

The results revealed that all brands showed a significant amount of release in the tested ions and the amounts of nickel and iron ions released was higher than chromium ion. Additionally, the longer the polishing time the higher the amount of ions release that's yields the level of significance. Acidic media has a great influence on the level of ions. Upon microscopical level, air abrasion polishing increased surface roughness and surface pits and crevices.

It can be concluded that the air polishing procedure increased the amount of ion release to subtoxic level and could be used in adult patients with prolonged interval between visits.