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



## Assessment of friction and surface roughness of nickel free orthodontic brackets and archwires in wet condition (An in vitro comparative study)

A Thesis Submitted to

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## Abstract

Exposure to the nickel containing orthodontic appliances may cause intraoral and/or extraoral allergic reactions in patients with nickel allergy. It is important to select for them a bracket/archwire combination that are nickel free and efficient during the treatment. Hence, the <u>aims</u> of this study is to evaluate and compare the frictional force and surface roughness of two types of nickel free brackets coupled with three types of nickel free archwires in wet condition.

For the <u>materials and methods</u> frictional forces of <u>six</u> bracket/wire combinations were measured by the <u>Instron</u> testing machine with a load cell of **10**N in the presence of artificial saliva. Each of the six groups of the bracket/wire combinations had been tested 10 times, in which a new bracket and wire were used in each trial to avoid their wearing, besides, a new elastomeric ligature on each trial was used. For the surface roughness test; three as received brackets and wires were tested, and from the groups that had been tested for their friction; three brackets and wires from each group were tested. The roughness test done by the <u>atomic force microscope</u>.

Independent samples t-test, ANOVA test for the parametric tests, and Mann-Whitney U test, Kruskal-Wallis test for the non-parametric tests were used.

<u>**Results**</u> showed a statistically significant difference in friction generation between the brackets (Ni free SS brackets generated lower friction than Co-Cr brackets) with no statistical difference regarding their surface roughness. For the archwires, there was a statistically significant difference among them in both friction generation and surface roughness (TMA wires generated higher friction and had the rougher surface than Ni free SS wires and rhodium wires).

As a <u>conclusion</u>, it is recommended to use nickel free SS brackets coupled with nickel free SS archwire in the second phase of the orthodontic treatment for patients with nickel allergy.

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