

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



## ASSESSMENT OF FRICTION AND SURFACE ROUGHNESS OF A NOVEL ORTHODONTIC WIRE FLEXYBLUETITANIUM. (AN IN VITRO COMPARATIVE STUDY)

A thesis submitted to the council of the College of Dentistry/ University of Baghdad in partial fulfillment of the requirement for the degree of Master of Science in Orthodontics

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## Abstract

**Introduction:** Friction plays a role in reducing the efficiency of orthodontic tooth movement, so it is necessary to understand the effect of friction and the amount of force needed to overcome its impact on orthodontic movement, thus the **aim** of this study is to compare among three different wires: NiTi, BlueTi NiTi and CuNiTi by measuring the sliding friction and surface roughness.

**Materials and Method:** A single bracket type were used (Dentaurum equilibrium®2) of lower central incisor, a total of fifty four specimens (three bracket each) was randomly divided into nine groups (six specimen each) the groups were classified according to the type of the wire and treatment condition (as received, thermocycling, distilled water), tested for sliding friction by Instron universal machine. Surface roughness of five samples of each group was examined by means of atomic force microscope.

**Results**: showed statistically significant difference among archwires in condition of as received and thermal cycling as NiTi generates higher sliding friction of 6.430N compared with 4.845N of CuNiTi in condition of as received, while NiTi also showed higher sliding friction of 8.807N compared with 6.337N of BlueTi NiTi in condition of thermal cycling. There was a statistically significant difference among conditions in both NiTi and CuNiTi (higher frictional resistance generated after thermal cycling), while there was a non-significant difference among conditions in case of BlueTi NiTi wire. The results of AFM showed non-significant difference among wires in the same condition.

**Conclusion**: BlueTi NiTi archwires showed lowest change in frictional forces among conditions, while NiTi wires showed highest frictional forces among wires and highest change in frictional forces among conditions.



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