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

The Effect of Fluoride Prophylactic Agents on the Load Deflection Characteristics of Heat Activated Nickel Titanium Orthodontic Arch wires (An In Vitro study)

A thesis

Submitted to the council of the College of Dentistry/University of Baghdad in partial fulfillment of the requirements for the degree of Master of Science in Orthodontics

By:

Rawaa Saadoon Hashim

B.D.S.

Supervised by:

Assist. Prof. Dr. Sami K. Al-Joubori

B.D.S., M.Sc.

H.D 2016 **H.A 1437**

Abstract

Thermal or heat activated nickel–titanium wires have become increasingly popular in orthodontic practice because of their ability to produce a light continuous force that is able to achieve a desirable biological response and hence tooth movement, and since oral hygiene must be intensified in orthodontic patients, orthodontists prescribe variety of prophylactic agents one of them is fluoride containing products.

This study was aimed to investigate the effects of three fluoride containing agents on the load deflection characteristics of thermal arch wires during loading and unloading phases and the influence of these agents on the percentage of hysteresis.

Eighty cut pieces of thermal arch wires were obtained from Ortho Technology Company, half of which had a 0.016 inch round cross section and the other with 0.019x0.025 inch rectangular cross section. These wires were immersed in one of the tested fluoride prophylactic agents (neutral sodium fluoride gel, Stannous fluoride gel or acidulated phosphate fluoride mouth rinse) or in the control medium "normal saline", placed in individually labelled plastic tubes and incubated at 37˚C for sixty minutes. A Wp 300 Universal material testing machine was used to perform a three point bending test in a water path at 37˚C ± 1˚C and the force values were measured during loading (activation) of the wire until 2 mm deflection and during unloading (deactivation) at 1.5 mm deflection. Percentage of hysteresis at 1.5 mm deflection was also computed. The statistical differences between the different agents were analysed using ANOVA and LSD tests.

Statistically, using fluoride prophylactic agents could decrease the unloading forces of the wires especially in neutral fluoride tested specimens, also the percentage of hysteresis at 1.5 mm deflection was highest in the neutral fluoride group. Based on the results founded in this study it preferred to use prophylactic agent with the least fluoride ions concentration.

It can be concluded that the tested agents have only a limited effect on the load deflection behaviour of the thermal wires, in a way that they might not have a clinically significant effect on the mechanical behaviour of the wires.