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Evaluate And Compare The Effect Of Acidulated Phosphate Fluoride On Load Deflection Of Gold Plated And Rhodium Coated Archwires In Comparison With The Conventional Ones (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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Abstract

Patients are recommended for regular using of prophylactic mouthwashes in order to control dental caries and periodontal diseases since orthodontic treatment may have detrimental effects on the tooth structures. However, chemical agents may potentially damage metal components of orthodontic appliances. The aim of this study was to evaluate and compare the effect of acidulated phosphate fluoride on load deflection of conventional, gold-plated and Rhodium coated nickel titanium and stainless steel archwires.

One hundred and twenty cut pieces of 0.016 inches round archwires were obtained from IOS (international orthodontic services) Company, USA, forty pieces from each type of archwires. These One hundred and twenty cut pieces were divided into twelve groups with ten cut pieces for each group, half of the groups were tested in dry condition and the other half were tested in a wet condition after being immersed in acidulated phosphate fluoride at thirty-seven ˚C for sixty minutes.

Three-point bending test was performed using Instron universal testing machine. Each specimen loaded and tested at (0.5, 1.0, 1.5, 2.0) mm of deflection. Loading was recorded for each specimen with a computer-controlled software program (Tinius Olsen's Horizon software). The data were analyzed using ANOVA and post hoc Tukey's tests.

A significant reduction can be noticed in the loading forces of the conventional nickel titanium and stainless steel archwires after immersion in acidulated phosphate fluoride. Gold-plated nickel titanium and stainless steel archwires have been characterized of not being long-lasting and, as a result, have a tendency to rub off or deteriorate leaving the nickel titanium or stainless steel core exposed. On the other hand, acidulated phosphate fluoride did not have any effect on the mechanical properties of Rhodium coated archwires.

In conclusion, conventional nickel-titanium and stainless steel archwires deteriorated with acidulated phosphate fluoride; while gold layer was rub off from the gold-plated archwires, in contrast, Rhodium coating protected the archwire from the acidulated phosphate fluoride effect and it did not have a significant effect on the loading force of these archwires. Hence, the patient and the dentist should be carefully use the fluoride containing products.