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Evaluation of Corrosion Pits in Different Types of Esthetic Coated Orthodontic Archwires in Dry and Wet Environment at Different Intervals

(*An In Vitro Study*)

A thesis submitted to the council of the College of Dentistry at the University of Baghdad, in partial fulfillment of the requirements for the master degree in science in orthodontics

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ABSTRACT

The demand for esthetic orthodontic appliances is increasing so the esthetic orthodontic archwires introduced. Among them Teflon and Epoxy coated stainless steel and Nickel Titanium archwires.

The amount of force available from the archwire depends on the structural properties and susceptibility to corrosion. All metallic alloys changed during immersion in artificial saliva, chlorhexidine mouthwash and toothpaste, but their behaviors differ from one type to another. They corrode at different rates, which lead to decrease the amount of force applied to the teeth, so they should change at certain intervals.

The aim of this study is to measure the corrosion pits in stainless steel and nickel titanium archwires coated with Teflon and Epoxy in dry and after immersion in artificial saliva, chlorhexidine (0.2%) (Parodontax) and toothpaste media (Sensodyne) for (1, 7 and 28) days intervals. Moreover, this study intended to compare the corrosion pits for each type of archwires at these different media among all intervals. Four hundred eighty pieces of orthodontic wires of Teflon (Hubit) coated Stainless steel (120 pieces) and Nickel Titanium (120 pieces), Epoxy (Orthotechnology) coated Stainless steel (120 pieces) and Nickel Titanium (120 pieces). Rectangular in cross section, size (0.019 x 0.025) inch and 15mm in length divided into four groups according to immersion media: (dry environment group, artificial saliva group, chlorhexidine group and toothpaste group).

The atomic force microscope used to measure the corrosion pits for all samples at dry and wet conditions and after different immersion periods.

The results of the present study showed non-significant differences in the corrosion pits of **all different wire types at Dry environment.**

Teflon coated Stainless steel archwires showed significant increase and highly significant increase in corrosion pits in artificial saliva with time,

while in chlorhexidine they showed a non-significant decrease then highly significant increase with time. In toothpaste medium, they showed highly significant decrease then highly significant increase with time.

Epoxy coated Stainless steel archwires showed non-significant difference in the corrosion pits in chlorhexidine at different time while they showed non-significant increase then highly significant increase with time immersion periods in artificial saliva. The results also showed the corrosion pits of these wires decreased non-significantly but increased highly significantly with time in toothpaste.

Teflon coated nickel titanium archwires exhibited high significant increase in corrosion pits in artificial saliva then they decreased significantly at 28 days. They showed non-significant increase then high significant decrease with time when they immersed in chlorhexidine mouthwash. In toothpaste medium, they showed non-significant decrease then high significant increase.

Epoxy coated nickel titanium archwires showed a high significant increase in corrosion pits in artificial saliva then they decreased non-significantly. They increased non-significantly then highly significantly at chlorhexidine at with time. They took different pattern in toothpaste media; they decreased significantly then increased highly significantly.