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A comparative study of the ion release of three different orthodontic arch wires immersed in artificial saliva – An In-Vitro Study

By

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ABSTRACT

BACKGROUND

Orthodontic treatment includes the use of various arch wires to achieve desired orthodontic tooth movements, the most common being nickel titanium arch wires. Newer orthodontic arch wires are introduced by manufactures for better mechanical properties, increased efficiency, enhanced aesthetics. Orthodontic arch wires are exposed in the oral cavity, undergo biodegradation and release metal ions, especially nickel. Hence it is crucial to quantify nickel release and assess biocompatibility of newly manufactured orthodontic wires.

AIM

To compare and evaluate the amount of nickel ion release from three different types of orthodontic wires.

METHOD

Nickel titanium, Copper Nickel Titanium and Teflon coated wires were received from various manufactures were immersed in artificial saliva (pH 6.8). each archwires were placed in separate containers containing 100mL of artificial saliva. A volume of 10mL taken at 4 weeks, 6 weeks, and 8 weeks respectively. Atomic absorption spectroscopy testing was done to evalute for the release of nickel ions.

RESULTS

The highest levels of nickel ions only during the first four weeks of immersion in artificial saliva was from nickel titanium wires. Copper nickel titanium archwires exhibited larger nickel ion concentrations for an extended time frame. During the first four to six weeks of immersion in artificial saliva, coated nickel wires had no

detectable nickel ion concentrations, but eventually increased significantly between weeks six and eight.

CONCLUSION

we conclude from our study that the nickel concentrations released from the three orthodontic archwires tested were significantly lower than the permissible limit of 200-300 μg in biological fluids. This implies that the nickel ion concentrations in all three archwires remained within acceptable biologically safe limits.

KEY WORDS- Orthodontic wires, Nickel ions, biodegradation, biocompatibility, Teflon coated wires, atomic absorption spectroscopy

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