BEHAVIOR CORROSION OF TITANIUM ORTHODONTIC ARCHWIRE

ABSTRACT

Various types of metallic orthodontic wire and brackets - stainless steel, cobalt-chromium-nickel alloy, nickel-titanium alloys, beta-titanium alloy are used in treatment of malocclusion. For correct of orthodontic case one must have a thorough knowledge of the material from which these appliance are made. The mechanical and physical properties of these materials change greatly under varying condition of manipulation. These metals undergo chemical or electrochemical reaction with the oral environment resulting in dissolution or formation of chemical compounds. Usually, several situations of the oral environment is highly aggressive and leads to corrosion. The aim of this study to determine the corrosion rate of orthodontic titanium archwires with immersion in artificial saliva. The rectangular 0.017 x 0.025 in. Beta Ti (3M United) and CNM (Ortho Organizm) were used in this study. To measure the corrosion rate the weight loss and plane interval test (7-14 days; 12-14 days; 12-21 days; 14-28 days) method has been used. The X-Ray Fluorochrome Spectroscopy was used to identify the elemental composition of wires, before and after corrosion process by immersion in artificial saliva. This study was taken and analyzed using Between Subjects and Multiple Comparison Test. The result show corrosion rate of CNM was higher than Beta Ti. The presence of alloy is very influential on the characteristics of orthodontic material.

Keywords: Orthodontic wire, Titanium Alloy, Corrosion rate, Artificial saliva.

INTRODUCTION

The corrosion behavior of orthodontic wires shows high corrosion resistance to saline solutions, such as Fager's solution, artificial saliva, and sodium chloride solution.

Factors such as temperature, quantity and quality of saliva, pH, ionic strength, physical and chemical properties and relative positions may influence corrosion.

The use of nickel and TMA wires has decreased over the past few years. However, these wires still have a significant role in orthodontics.

Some studies have shown that the corrosion behavior of orthodontic wires is influenced by the composition of the wires, the environment, and the duration of exposure.

The purpose of this study was to evaluate the corrosion behavior of orthodontic wires made of titanium.

RESEARCH PROCEDURE

The TMA orthodontic wire Beta III Ti (3M United) and CNM were used in this study. The wires were immersed in artificial saliva (pH 6.2) over an extended time interval (7, 14, 21, and 28 days) at 37°C.

The result was graphically analyzed with the help of a statistical software to determine the corrosion rate.

RESULT

The X-ray Fluorochrome Spectroscopy was used to identify the elemental composition of Beta Ti wire and to investigate the dissolution of enamel/bracket before and after immersion in artificial saliva.

The corrosion behavior of wire CNM was higher than in TMA wire.

CONCLUSION

The composition of the alloy content of material will greatly influence the behavior of corrosion on the wire orthodontic material.

REFERENCES

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