

Determination of genotoxicity in oral mucosa cells with fixed orthodontic and miniscrew appliances using the comet assay

Martín-Cameán Ana¹, Puerto María², Jos Angeles², Azqueta Amaya³, Iglesias-Linares Alejandro⁴, Solano Enrique¹, Cameán Ana M²

¹Stomatology Department, School of Dentistry, University of Seville, Spain; ²Area of Toxicology, Faculty of Pharmacy, University of Seville, Spain; ³Department of Pharmacology and Toxicology, School of Pharmacy, University of Navarra, Spain; ⁴Stomatology Department, School of Dentistry, University Complutense of Madrid, Spain.

Orthodontic appliances are usually made of stainless steel alloys, which contain metals. The mouth properties (thermal, microbiological and enzymatic) offer an ideal environment for the biodegradation of orthodontic appliances, consequently facilitating the release of metal ions that are related to adverse health effects, such as cellular and genetic toxicity. Although the genotoxic potential of some orthodontic appliances (e.g. brackets) has been investigated, as far as we know, this is the first time to determine the genetic toxicity in patients undergoing orthodontic, and orthodontic and miniscrew treatment, using the comet assay in buccal cells. Oral mucosa cells were obtained from 60 individuals ranging from 19 to 63 years old. These patients were classified into three groups: the orthodontic group (11 men, 9 women), treated with fixed orthodontic appliances in both arches; orthodontic-miniscrew group (10 men, 10 women), with fixed orthodontic and miniscrew treatment; and the control group (8 men, 12 women). The eligibility criteria for control subject selection included nonsmokers and without oral diseases, systemic diseases, oral restorations or prosthetics. The results indicated a significant increase of % DNA in tail and olive moment in the orthodontic and orthodontic-miniscrew groups, compared to the control group, but not between each other. When orthodontic, orthodontic-miniscrew and control groups were compared by gender, similar results were obtained in women. In contrast, no significant differences were observed in orthodontic groups-men compared to the control group-men. In conclusion, fixed orthodontic appliances and orthodontic and miniscrew appliances induced DNA strand breaks in buccal cells, being the % DNA in tail and the olive moment similar in both groups. Further investigations are necessary in order to assess the genotoxic potential of orthodontic fixed appliances associated with miniscrews.

Acknowledgement: The authors wish to thank the Junta de Andalucía (PAIDI CTS-358) for the financial support for the present study. The present results constitute part of the doctoral thesis of Martín-Cameán A at the University of Seville, Spain.