In vitro assessment of 3 dentifrices containing fluoride in preventing demineralization of overdenture abutments and root surfaces

Presented at the International Association of Dental Research annual meeting, Seattle, Wash, March 2013.

Zachary S. Goettsche, BA, Ronald L. Ettinger, BDS, MDS, DDSc†, James S. Wefel, PhD†, Mary M. Hogan, BA, Jeffery D. Harless, BS, MS, Fang Qian, PhD†
Deceased.

Published Online: September 29, 2014

DOI: http://dx.doi.org/10.1016/j.prosdent.2014.01.031

Statement of problem
Caries development under overdentures has been a continuing problem and requires the daily use of fluoride to prevent demineralization.

Purpose
The purpose of this in vitro study was to compare the effectiveness of dentifrices containing tricalcium phosphate or calcium phosphosilicate in combination with fluoride to prevent the demineralization of overdenture abutments and root surfaces.

Material and methods
A total of 56 caries-free extracted teeth were prepared as overdenture abutments. The teeth were painted with acid-resistant varnish, leaving one 1×4-mm window on occlusal and root surfaces. The teeth were randomly divided into 4 groups: a control group treated with distilled/deionized water only, a group treated with ClinPro 5000, a group treated with ReNew, and a group treated with Prevident 5000 gel. Each tooth was subjected to a demineralizing/remineralizing cycling protocol for 12 days with the appropriate treatment products. The teeth were sectioned longitudinally through both windows. Photomicrographs were made of 3 representative sections from each tooth. A representative section was defined as one that included both windows and was cut from the part of the tooth that had the flattest surface to reduce the edge effect. The depths of the lesions were measured on representative sections from each group. A 1-way MANOVA and a 1-way ANOVA with the post hoc Tukey-Kramer test were used to evaluate the treatment effects on the criterion variables (α=.05).

Results
The total lesion depths of the control teeth on the occlusal surface were not statistically significantly deeper than for the 3 dentifrices (P=.7705). However, all 3 dentifrices had narrower cavitation depths than the control (mean cavitation band depth, 43.59 [ReNew] versus 37.99 [Prevident 5000 gel] versus 36.70 [ClinPro 5000] versus 246.86 [control] (P<.001). The mean remineralization band depth for ClinPro 5000 was significantly greater than for the other 2 treatment groups (118.03 [ClinPro 5000] versus 107.80 [ReNew] versus 102.28 [Prevident 5000 gel])
On root surfaces, the total lesion depth for the control group was statistically significantly deeper than for the 3 dentifrices (mean total lesion depth, 150.31 [control] versus 82.05 [ReNew] versus 68.10 [ClinPro 5000] versus 56.97 [Prevident 5000 gel]) (P<.001). The data indicated that teeth treated with Prevident 5000 gel had the shallowest total lesion depth and were statistically significantly different from those treated with ReNew and ClinPro 5000. Moreover, teeth treated with ReNew were found to have the largest remineralization band depth, which was statistically significantly different compared with ClinPro 5000 and Prevident 5000 gel (mean remineralization band depth, 49.66 [ReNew] versus 36.14 [ClinPro 5000] versus 23.27 [Prevident 5000 gel]) (P<.001), but no difference was found in cavitation depth of the root lesions between the 3 dentifrices.

Conclusions
The addition of tricalcium phosphate or calcium phosphosilicate to fluoride-containing dentifrices (5000 ppm) does not significantly improve their ability to prevent demineralization of the cut dentin surface of overdenture abutments. However, on root surfaces, ReNew, which contains calcium phosphosilicate, was found to improve remineralization of the lesions compared with Prevident 5000 gel or ClinPro 5000.

Purchase access to this article
You must be logged in to purchase this article.

Claim Access
If you are a current subscriber with Society Membership or an Account Number, claim your access now.

Subscribe to this title
Purchase a subscription to gain access to this and all other articles in this journal.

Institutional Access
Visit ScienceDirect to see if you have access via your institution.

To access this article, please choose from the options below

Log In

Register
Create a new account

Supported by an Iowa Center for Research by Undergraduates Research Fellow Grant. Materials supplied by 3M ESPE Dental Products and Sultan Healthcare.

© 2014 Editorial Council for the Journal of Prosthetic Dentistry. Published by Elsevier Inc. All rights reserved.