Original Paper

Caries Research

Caries Res 2006;40:43–46
DOI: 10.1159/000088905

Received: March 28, 2002
Accepted after revision: February 16, 2005

The Effect of Adding Calcium Lactate to Xylitol Chewing Gum on Remineralization of Enamel Lesions

R. Suda[a] T. Suzuki[a] R. Takiguchi[b] K. Egawa[b] T. Sano[b] K. Hasegawa[a]

[a]Department of Periodontology and [b]First Department of Oral Anatomy, Showa University Dental School, Tokyo, Japan

Key Words
Calcium lactate · Chewing gum · Enamel lesion · Remineralization · Xylitol

Abstract
The purpose of the study was to determine whether adding calcium lactate to chewing gum containing xylitol enhances remineralization of enamel surfaces using an early caries lesion model. Enamel slabs were cut from human extracted sound teeth and artificial subsurface lesions created within each. Half the enamel slabs were used as controls and stored in a humidifier while half were mounted into oral appliances worn by 10 volunteers (22–27 years old, 2 males and 8 females) in a three-leg trial, during which they wore the appliance without chewing gum, chewed gum containing xylitol + calcium lactate or chewed gum containing only xylitol 4 times a day for 2 weeks. Calcium concentrations in the enamel surfaces of control and test slabs were measured by X-ray spectrometry and degrees of remineralization were calculated. The mean degree of remineralization was greater after chewing xylitol-Ca gum (0.46 ± 0.10) than after no gum (0.16 ± 0.14) or after chewing xylitol gum (0.33 ± 0.10) ($p < 0.01$). In conclusion, chewing gum containing xylitol + calcium lactate could enhance remineralization of enamel surface compared to chewing gum containing only xylitol or no gum chewing.

Xylitol, a five-carbon natural sugar alcohol, is widely used as a noncariogenic sweetener, which is not fermentable by most oral bacteria [Trahan, 1995]. Several studies show that xylitol also reduces demineralization of the subsurface enamel and increases its hardness in vitro and in vivo [Scheinin et al., 1993; Smits and Arends, 1988]. It has been reported that xylitol migrates with calcium ions in an electric field [Angyal and Millis, 1979; Kieboom et al., 1979]. Calcium lactate is generally used as a calcium supplement and food additive. The purpose of this study was to determine whether the effect of remineralization of enamel surface by xylitol can be enhanced when calcium lactate is added to gum containing xylitol.

Materials and Methods

Enamel Lesions

Premolars extracted for orthodontic reasons or impacted third molars with sound enamel surfaces were used to make enamel slabs. After extraction, the teeth were fixed in 18% v/v formalin acetate solution. Blocks of the outer enamel surface, approximately 8 × 4 mm (2 mm deep) were cut using a water-cooled diamond blade saw. Each slab was covered with acid-resistant nail varnish except for two mesiodistal windows (1 × 6 mm) separated from each other by about 1 mm. The slabs were immersed in 40 ml of demineralization buffer consisting of 20 g/l Carbopol 907 (carboxypolymethylene), 500 mg/l hydroxyapatite (Bio-Gel HTP) and 0.1 *M* lactic acid, pH 4.8, for 4 days at 37°C. The solution was changed after 2 days. After demineralization, each enamel slab was sec-

KARGER
Fax +41 61 306 12 34

0008–6568/06/0401–0043$23.50/0

Reiko Suda
Department of Periodontology, Showa University Dental School
2-1-1 Kitasenzoku, Ohta-ku, Tokyo 145-1958 (Japan)