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STREPTOCOCCUS MUTANS AND LACTOBACILLI ON GLASS IONOMER CEMENTS

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Abstract

The purpose of this study was to evaluate the quantity of *Streptococcus mutans* and lactobacilli on enamel surfaces and one year old glass ionomer cement and compomer. The class V fillings, with their cervical margins placed subgingivally, were placed in the incisor, canine and premolar. The teeth to be filled had cervical abrasion or erosion defects. The evaluation was done in a cross sectional study, where the patients continued to use their customary oral hygiene procedures and during a 14-day period of experimental plaque formation. In this study no difference was seen in the number of bacteria recovered from one year old glass ionomer cement fillings compared to the enamel and composite resin surfaces. The fluoride levels in plaque adjacent to glass ionomer cement did not become high enough to inhibit the accumulation of the investigated bacteria. In this study we found that there was the same critical levels of *Streptococcus mutans* on glass ionomer cement and compomer. Only one of the test subjects had a number of lactobacilli. Differences in numbers of bacteria on the teeth could be due to different toxicologic effects of the restorative materials. The levels reached in plaque adjacent to the material did not become high enough to inhibit the growth of *Streptococcus mutans* and lactobacilli.

Keywords: Glass ionomer cement, compomer, *Streptococcus mutans*, lactobacilli

Introduction

The composition of dental plaque can be affected by the chemical properties of different restorative materials (Cury et al., 2000). The caries preventive effects of fluoride have stimulated the inclusion of fluoride in a host of dental materials (Ajdic D., 2002). One explanation of the cariostatic effect of fluoride is the interference of fluoride on the adherence of bacteria to the enamel pellicle (Lindquist B., 1989). Several studies suggest that the normal resistance of most of the oral organisms is such that their growth would not be inhibited by the levels in the plaque (Berg J.H., 1988). Earlier studies have shown a relationship between the salivary concentration of *Streptococcus mutans* and lactobacilli and their colonization on enamel surfaces (Koo H. et al., 2002). The purpose of this study was to compare individually the occurence of *Streptococcus Mutans* and lactobacilli on glass ionomer cement, composite resin, and sound enamel surfaces, and to relate it to salivary levels of these bacteria.

Material and method

The evaluation was done in patients who continued to use their customary oral hygiene procedures and during a 14-day period of experimental plaque formation.The patients gave informed consent. The class V fillings, with their cervical margins placed subgingivally, were placed in the anterior or premolar region of 20 pacients. The teeth to be filled had cervical abrasions or erosions. In the first group, the defects were filled with a compomer (Dyract AP). The second group was restored with a glass ionomer cement (Fuji IX).

In the third group, experimental teeth showed a non-abrasive and non-filled enamel surfaces. The evaluations were made about 1 year after insertion of the fillings. The patients continued to use their customary oral hygiene procedures. Bacterial plaque samples were taken from the experimental teeth after isolation with cotton rolls and a suction device. Saliva and plaque samples were brought to the laboratory and cultured within 3 h. The bacterial deposits on the paper strips were dispersed by treating in a mixer at the maximal setting for 30 s. Saliva samples were treated in the same way. The number of lactobacilli, total streptoccoci and *Streptococcus mutans* were determined. The results of this study were compared using Friedman's two-way analysis of variance .

Results

The intraindividual differences of number of lactobacilli, *Str.mutans* , and total streptococci between the test surfaces were not statistically signifiant. The numbers of streptococci, lactobacilli and *Str.mutans* per ml of saliva at day 14 are given in Table 1.

Two subjects had number of lactobacilli higher than 10^5/ml saliva, when nine subjects showed lactobacilli levels between 10^4-10^6/ml saliva. Lactobacilli could not be isolated from the test surfaces of any of the subjects.

Table 1. Number of microorganisms per ml of saliva

	No.of subjects	Cross-sectional study (range)	Day 14 of experimental plaque (range)
Lactobacilli	16	$3.0x10^2$	$7.5x10^3$
Str.mutans	16	$3.5x10^4$	$1.9x10^5$
Total streptococci	16	$1.4x10^7$	$4.0x10^7$

Table 2 shows the number of microorganisms recovered from the test surfaces at day 0 and day 14. The differences between the test surfaces were not statistically different($p<0.05$).

Table 2. Number of microorganisms recovered from test surfaces at day 0 and day 14 in dental plaque

	Enamel		Dyract AP		Fuji IX	
	Day 0	Day 14	Day 0	Day 14	Day 0	Day 14
Lactobacilli	0	1	0	2	0	2
Str.mutans	3	7	4	7	4	7
Total streptococci	11	16	12	16	12	16

Discussions

The number of lactobacilli and *Streptococcus mutans* recovered from the restored and intact teeth surfaces confirm earlier observations that below critical salivary concentrations no microorganisms could be detected on enamel[6].

Van Houte et al [8] have also shown that lactobacilli are not usually detected in plaque from a buccal tooth surfaces without manifesting carious lesions. The proximal plaque facilitates establishment of lactobacilli, especially in an acidic environment created by a high frecquent intake of fermentable carbohydrates[4].

The antibacterial activity of the dental materials used in the treatment of caries could have many causes. Chemical composition, low pH during binding, and the release of fluoride and other ions are of great importance (Boeckh C, 2002; Fraga R.C., 1996). DeSchepper (1998) and Herrera (1999) suggesed that fluoride activity and bacterial cells depends not only on

amount of the ion, but also on the material's pH during binding. As shown in some studies, glass ionomer cements are characterized by low pH during biding, which is maintained from several minutes to 24 hours (Scherer W., 1989; Vermeersch G, 2005).

However, long-term clinical studies should be conducted in order to verify the results.

Conclusion

In this study we found that the same critical levels of *Streptococcus mutans* were on glass ionomer cement and compomer. Only one of the test subjects had a different number of lactobacilli. Differences in numbers of bacteria on the teeth could be due to different toxicologic effects of the restorative materials.

The levels reached in plaque adjacent to the material did not become high enough to inhibit the growth of *Streptococcus mutans* and lactobacilli.

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