

## The Effect of the Combination of Mouthwash and Saliva Substitutes on Tooth Erosion: An in Vitro Study

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**Abstract :** As the elderly population increases, the number of patients complaining of dry mouth is also increasing. Elderly people often use mouthwash to prevent periodontal disease. Mouthwash and saliva substitutes with low pH were reported to be able to cause enamel erosion. To the best of our knowledge, there have been no studies showing the effect of mouthwash on patients using saliva substitutes. Therefore, the purpose of this study was to evaluate the effect of the use of mouthwash in combination with saliva substitutes on tooth erosion using a quantitative light-induced fluorescence-digital (QLF-D) system. A total of 96 bovine specimens were embedded in putty blocks and randomly allocated to the following groups with n = 12 each: Group 1, application of mouthwash; Group 2, application of saliva substitutes; Group 3, application of saliva substitutes in combination with mouthwash; and control group, application of saline. The bovine samples were eroded using a demineralization solution and then saliva substitutes and mouthwash were applied according to the groups for 2 weeks. For saliva substitutes, three different products were used; Oasis (Oasis Consumer Health, Cleveland, OH, USA), Xeromia solution (Osstem Pharma Co., Seoul, Korea), and Drymund gel (Dong-A Pharma Co., Seoul, Korea). The pH values of the saliva substitutes were determined using a pH meter. Loss of enamel and root dentin was measured using the QLF-D system immediately after demineralization on the 3rd, 7th, and 14th days. The data were analyzed using repeated measures ANOVA followed by Tukey's post hoc tests ( $p < 0.05$ ). Mineral loss in enamel and root dentin was detected when mouthwash and saliva substitutes were used alone, respectively ( $p < 0.05$ ). Also, when mouthwash was used with saliva substitutes, the mineral loss was observed in enamel and root dentin ( $p < 0.05$ ). The use of Xeromia and Drymund gel increased mineral loss of enamel significantly compared to the use of Oasis ( $p < 0.05$ ). However, when Drymund gel and Xeromia were used in combination with mouthwash, mineral loss of enamel was significantly reduced compared to when they were used alone ( $p < 0.05$ ). The pH values of Drymund gel, Xeromia, Oasis, and mouthwash were 5.5, 5.52, 6.2, and 6.37, respectively. Based on these results, it can be concluded that the use of mouthwash with a higher pH value than that of saliva substitutes could help patients suffering from xerostomia avoid the risk of dental erosion.

**Keywords :** saliva substitute, mouthwash, tooth erosion, dry mouth

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