

Application of Quantitative Light-Induced Fluorescence-Digital for the remineralization evaluation on artificial enamel caries

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1. Introduction

Dental Caries is one of the most common diseases in human, and causes a decrease in the level of mineral substances in the tooth. The disease can occur when the balance of mineral exchange is broken. Early stage caries can be recovered by supplying minerals such as calcium, phosphate and fluoride. Quantitative Light-Induced Fluorescence (QLF) is the representative initial caries diagnostic equipment which can distinguish between the carious lesions and sound tooth structure. Recently, Quantitative Light-Induced Fluorescence-Digital (QLF-D) utilizing a digital camera system have been developed. QLF-D (Inspektor Research systems BV, Amsterdam, the Netherlands) can quantify the amount of plaque without disclosing as well as the initial caries lesions. The aim of this study was to compare the remineralization effect of the topical fluoride gel and solution on artificial carious lesions using QLF-D.

2. Materials & Methods

Human enamel specimens were formed artificial enamel caries (2x 2 mm) with Carbopol 2050. Twenty four dentin specimens were divided randomly into the following three groups; control group (no treatment), fluoride solution (2% NaF group), fluoride gel (1.23% APF group). Specimens, except in the control group, were applied to each topical fluoride agent for 4 minutes. Also, the specimens of all groups were immersed in human saliva for 1 hour. Mineral loss value of artificial carious lesion is shown as the ΔF and the ΔQ by QLF-D. ΔF indicates the depth of the lesion, the ΔQ value appeared the volume (depth x area) of the lesion. To compare the ΔF value, the results between the groups were analyzed by one-way ANOVA and Tukey's post hoc analysis using the PASW statistics 18.0 (SPSS Inc., Chicago, IL, USA).

3. Results

The ΔF values of baseline specimens which were formed the artificial caries lesions ranged from -5.98 to -7.27 in each group. After fluoride treatment, the ΔF value in two groups had decreased compared to the baseline. However, there were no significant differences between the experiment groups. After immersed in saliva for 1 minute, Fluoride gel group is statistically significantly decreased of the lesion depth compared to control group and fluoride solution group ($p < 0.05$).

[Table 1] ΔF value change of the artificial carious lesions on fluoride treatment before and after

Group	N	Baseline	After treatment	Difference value
Control	8	-5.98±0.67	-5.88±0.29	0.12±0.85 ^a
Fluoride solution	8	-6.45±0.98	-6.33±3.38	0.12±1.31 ^a
Fluoride gel	8	-7.27±1.43	-5.37±2.72	1.90±1.49 ^b
<i>p-value</i>		.418	.099	< 0.001

All values mean the Mean ±Standard deviation

^{a,b}The same letter indicates no significant difference at $\alpha=0.05$ by Tukey's multiple comparison test.

4. Conclusions

The 1.23% APF gel is the most effective in the treatment of remineralization of artificial caries lesions. Also, the QLF-D could be useful for the evaluation of the remineralization effect on incipient carious lesions.

5. References

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