

Effect of “Campaign for Tooth Brushing after Lunch” at Junior High Schools Using a Fluoride Toothpaste on the Prevention of Dental Caries

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Abstract : Junior high school students have a low rate of tooth brushing after lunch and a high infection rate of dental caries, as compared to elementary school students. Therefore, a “Campaign for tooth brushing after lunch” was performed at junior high schools, and the effect of this campaign which used a fluoride toothpaste on the prevention of dental caries was evaluated. In the campaign, brushing instruction was not given, toothbrushes and fluoride toothpastes for tooth brushing after lunch were distributed to the schools, and an attempt was made to create an environment which makes it easy for the students to brush their tooth after lunch. As a result, in the groups that participated in the campaign, the increase in caries incidence was reduced by 48.1% ($p < 0.05$), compared to that in the previous year when the campaign was not performed.

Key words : school dental health, fluoride toothpaste, junior high school student, tooth brushing after lunch

Objective

In Europe, dental caries in adolescents and younger children has rapidly reduced, and WHO has listed widespread use of fluoride toothpastes as a main reason for the reduction¹⁾. The effect of fluoride toothpastes on the prevention of dental caries has been confirmed in systematic reviews as well²⁾. In the national health promotion policy “Health Japan 21”, spreading the use of fluoride

toothpastes is stipulated as a dental caries prevention policy for school age children, and in our country as well, dental caries in school age children has been dramatically reduced in recent years. Further, as seen in “the survey of the dental diseases (2011)”³⁾, the DMFT (decayed, missing, and filled teeth) index for 12-year-old students has been reduced to 1.4 teeth. However, in junior high school students and older students, the incidence of permanent tooth caries is greater than that in elementary school students, and thus the prevention of dental caries in students 12 and older is an important goal for school dental health. Further, looking at the actions for health that people themselves take, in the elementary school students, the rate of tooth brushing after lunch is high, whereas, in the junior high school students, the rate of tooth

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brushing after lunch is markedly reduced. To deal with this situation, a campaign for promoting tooth brushing after lunch at junior high school was conducted as one of the school health activities. Then, the effect of the tooth brushing after lunch using a fluoride toothpaste on the prevention of dental caries was evaluated.

Subjects and Methods

From two junior high schools which had approved of the goals of the “Campaign for tooth brushing after lunch”, 197 students (109 students in the second year and 88 students in the first year) were selected as subjects, and the campaign was performed for them. To give them motivation to brush their tooth after lunch, toothbrushes (Clear Clean Multi-Care™) and two-agent type fluoride toothpastes (containing NaF and MFP, F concentration 950 ppm) (Clear Clean Plus™) were distributed to the schools participating in the campaign to promote the tooth brushing after lunch at school. The toothpastes were additionally distributed every three months so that the students could continue the tooth brushing after lunch for one year. When distributing the toothpastes and toothbrushes, instruction in the proper brushing method etc. was not made, except for the instruction to use 1 g of the fluoride toothpaste per

brushing. The campaign was continued for one year. 15 students who could not continue the campaign due to the change of school during the campaign or who could not be examined for caries during the campaign were excluded. The incidence rate of caries in the 182 students who were subjects during the campaign was determined from the results of the dental health examinations, mandated by School Health Safety Law, carried out on these students before and after the campaign. The results of dental examination of the participating students were processed so as not to contain information by which the individual students could be identified, and then provided by the school. These results and the changes in caries incidence in the school year before the campaign was performed were compared to evaluate the effect of the campaign for tooth brushing after lunch on the prevention of dental caries. In a statistical analysis, Mann-Whitney U test was used, and the statistical software SPSS was used.

Results

The increase in caries incidence in the year of the present campaign and the increase observed in the previous school year as the control groups are shown in Tables 1 and 2. In the one year of the campaign, dental caries increased by 0.24 teeth

Table 1 Average DMF index increase in one year from the first year to second year of junior high school

	First year → Second year		
	First year	Second year	ΔDMF
Campaign (86)	2.01 ± 2.27	2.25 ± 2.36	0.24 ± 1.19
Control (97)	1.83 ± 2.35	2.30 ± 2.70	0.47 ± 1.00

Table 2 Average DMF index increase in one year from the second year to third year of junior high school

	Second year → Third year		
	Second year	Third year	ΔDMF
Campaign (97)	2.30 ± 2.70	2.62 ± 3.18	0.31 ± 1.15
Control (95)	2.87 ± 2.92	3.48 ± 3.37	0.61 ± 1.24

Table 3 DMF increase in one year for all junior high school students

	All junior high school students		
	Start	End	ΔDMF
Campaign (183)	2.16 ± 2.50	2.45 ± 2.82	0.28 ± 1.17*
Control (192)	2.34 ± 2.69	2.89 ± 3.10	0.54 ± 1.12

reduction rate: 48.1% * p<0.05

on average in the first year students, and dental caries increased by 0.28 teeth in the second year students. On the other hand, among the students in the one year before the campaign was performed who were used as the control groups, the caries increase in the first year students and the second year students was 0.47 and 0.54, respectively. The caries increase in all the subjects is shown in Table 3. The caries suppression rate of this campaign was 48.1%, which shows that dental caries was significantly reduced during the campaign ($p<0.05$).

Discussion

WHO has reported that the use of a fluoride toothpaste is the most important measure for prevention of dental caries¹. Horowitz et al. have reported that the tooth brushing using fluoride-free toothpaste had no effect on the prevention of dental caries even when brushing instruction by experts was given so that no plaque remains unbrushed⁴. Tsutsui et al. have reported that they evaluated the health activities performed in the elementary schools, and found that the brushing after school lunch using no toothpaste exhibited no clear effect on the prevention of dental caries⁵.

Marinho VC et al. have determined that the caries suppression rate of a fluoride toothpaste is 25%, making this calculation by meta-analysis².

In the present campaign, a two-agent type fluoride toothpaste was used, and it has been reported that the fluoride toothpaste causes fluoride uptake

in dental plaque or Hap plate to be higher than a one-agent fluoride toothpaste, and has high recalcification effect upon enamel in the initial stage of caries^{6,7}.

In the present campaign, the caries suppression rate was extremely high, even taking the use of the two-agent type toothpaste into consideration. One of the reasons for this is likely that the groups of subjects in this campaign were limited to students in the first and second years of junior high school, which correspond to the eruption period of the second molar that is a favored site for dental caries, so that this is a period during which the fluoride toothpaste can have great effect.

Zero et al. have shown that, in brushing using a fluoride toothpaste, the amount of the toothpaste used is important⁸. Further, Koga et al. have reported that, for enhancing the fluoride uptake in enamel from an NaF-containing toothpaste having 1,000 ppm F, the amount of the toothpaste used is preferably 1 g or more⁹.

Furthermore, junior high school students are of an age when they are left to carry out oral health activities independently. They are engaged in a wide variety of things in their daily life, and hence are apt not to strictly observe a dental hygiene procedure. It often is difficult to get such individual students to change their daily routines by giving them health instruction. In the present campaign, a dental caries prevention effect could be obtained just by giving an instruction as to the amount of the toothpaste to use, without giving instruction regarding the brushing method. We

considered that it is important to give health instruction that is likely to be followed. Another key feature of the campaign was that brushing materials were distributed to everyone in the groups, creating an environment that made it natural for the subjects to brush their tooth after lunch. This suggests that if junior high school students are placed in a situation where it is very easy for several of them to brush their teeth together, they will be motivated to act accordingly.

Conclusion

a campaign to promote tooth brushing after lunch among junior high school students was performed by distributing toothbrushes and fluoride toothpastes to the students. As a result, their caries increase was reduced by 48.1% in the one year of the campaign, compared to that of junior high school students in the previous year.

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