



## **Effectiveness of High Frequency of Two-Year Supervised Brushing with Fluoride Gel in Permanent Teeth in Children from Poland**

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### **Dear Editor-in-Chief**

Dental caries is one of the most prevalent diseases among children and adolescents. The results of Polish surveys conducted regularly since 1987 indicate high level of dental caries. In north-eastern Poland 5.3% of 6-yr-olds from urban and 8.2% from rural areas were caries free. In 2005 only 8.2% and in 2008, 24.4% of Polish 6-yr-old children participated in caries-preventive programs (1-3). The most common form of caries-preventive program is supervised tooth brushing with fluoride gels. This is in accordance with regulations issued by the Polish Ministry of Health, which state that a school-based program should be conducted among pupils from 1 to 6 grades with brushings 6 times during the school year (4). WHO target of reducing the number of 6-year-old children with caries to 60% is impossible to achieve in Poland (5). The Polish National Health Program for 2007–2015 emphasized the need to increase school-based fluoride prevention in children aged between 7 and 12 (4).

This study aimed to assess the effect of high frequency of 2-year supervised tooth brushing with fluoride gel on caries reduction in permanent teeth in children from north-eastern Poland.

The study was conducted among 7-yr-old school children. Two-stage cluster sampling was used to

select participants. Participating were only those schools whose headmasters allowed the program to be conducted, and those pupils whose parents or caregivers gave their written consent. The total of 271 children was divided into 4 groups according to frequency of brushings with aminofluoride gel containing 1.25% F: focus group A32 and 3 control groups, B6, Bx and B0. In focus group A32 children brushed their teeth 32 times during a school year. In group B6 children brushed their teeth every 6 weeks, 6 times a year, as recommended by the Ministry of Health (4); in group Bx brushing every 6 weeks was declared while in fact it was carried out irregularly. In group B0 children did not have any form of organized caries prevention procedure. Children brushed their teeth for 3 minutes with aminofluoride gel, spat out the residue and rinsed their mouths with a small amount of water. To eliminate the risk of adverse effects, the amount of gel was limited to about 0.3 g, which corresponded to about 3.75 mg of fluoride and daily intake balance was performed, including all the fluoride sources: drinking water, toothpaste and gel. Preliminary, after a year and 2 years clinical examinations were conducted in artificial light in school rooms using a dental mirror and blunt probe. The decayed, missing and filled

teeth (DMFT) index for permanent teeth was recorded with WHO recommendations (6). Caries increment (Ic) calculated as the difference between baseline and final examination was expressed numerically and by percentage. Reduction in caries development was expressed by the preventive fraction (PF), the proportion of the difference between mean Ic in each examined and reference group divided by mean Ic in the reference group;  $Ic_{ref} - Ic_{exam} / Ic_{ref} \times 100$ . Number of children needed to treat (NNT) was measured on the

basis of the mean annual Ic in reference to the control group. Statistical analysis was performed using the STATISTICA 8.0 package from StatSoft. Results with a  $P < 0.05$  were considered significant.

We analyzed the intensified frequency of supervised tooth brushing with aminofluoride gel from clinical and pharmacoeconomical point of view. There were no statistical differences in caries experience between groups A32 and B6 in the second and final examination (Table 1).

**Table 1:** Caries experience by DMFT score and caries increment after AmF gel application

		Group A32	Group B6	Group Bx	Group B0	Kruskal-Wallis test
1st examination	Mean DMFT (SD)	1.72 (1.48)	1.56 (1.34)	1.93 (1.48)	1.81 (1.64)	$P > 0.05$
2nd examination	Mean DMFT (SD)	1.92 <sup>ab</sup> (1.50)	1.89 <sup>c</sup> (1.57)	2.63 <sup>a</sup> (1.78)	3.10 <sup>bc</sup> (1.92)	$P < 0.001$
3rd examination	Mean DMFT (SD)	2.21 <sup>ab</sup> (1.61)	2.35 <sup>cd</sup> (1.54)	3.23 <sup>ac</sup> (1.93)	3.95 <sup>bd</sup> (2.13)	$P < 0.001$
Ic (3rd exam – 1st exam)	Mean Ic (%)	0.48 (28)	0.80 (51)	1.31 (68)	2.14 (118)	
		$P < 0.001^*$	$P < 0.001^*$	$P < 0.01^*$	$P < 0.001^*$	

DMFT (Decayed, Missed and Filling teeth); SD (standard deviation); Ic (caries increment)

\*Wilcoxon test ; <sup>a,b,c,d</sup> post hoc tests Dwass- Steele-Critchlow- Flinger tests;  $P < 0.05$

Throughout the 2-year preventive program mean Ic was statistically significant in each group. The lowest Ic appeared in group A32 (0.48 DMFT). Caries reduction was measured as the PF in refer-

ence to subsequent groups: B0, Bx and B6. Biannual prevention resulted in caries reduction in all test groups (Table 2). The largest PF in relation to group B0 was obtained in group A32 (77.47%).

**Table 2:** Preventive effect expressed using percentage reduction in caries increment and the number of children needed to be treated to prevent one tooth from developing caries

	Group A32	Group B6	Group Bx	Group B0
Mean Ic (%)	0.48 (28%)	0.80 (51%)	1.31 (68%)	2.14 (118%)
PF in reference to group B0	77.47%	62.84%	38.93%	----
PF in reference to group Bx	63.11%	39.15%	-----	----
PF in reference to group B6	39.37%	-----	-----	----
Mean annual Ic	0.24	0.40	0.66	1.07
NNT in reference to group B0	1.2	1.5	2.4	-----
NNT in reference to group A6	6.3	-----	---	----

Ic: caries increment; PF: preventive fraction; NNT: number of children needed to treat

Caries reduction in children with 32 gel applications was 63.11% comparing to children with ir-

regular brushing (Bx). Using the gel 6 times a year resulted in an average 62.84% PF and almost a

40% PF in relation to group B0 and Bx, respectively. Similarly, almost a 40% PF in group A32 was found in relation to group B6. In children with regular applications an average of between 0.24 and 0.4 teeth with caries were detected in contrast with the non-intervention group, where per year an average of 1.07 teeth in each child experienced a caries event. The lower the value of NNT, the stronger the resulting effect of amino-fluoride gel intervention. Biannual NNT index calculated in relation to group B0 was almost equal for groups A32 and B6, 1.2 and 1.5, respectively. On the other hand, NNT for group A32 did not confirm higher effectiveness in comparison to 6 brushings (NNT=6.3). Statistical analysis showed no significant difference in the increase of caries experience between groups A32 and B6, although in the group with the higher number of brushings mean Ic was nearly half as small. Thus, the efficiency in both groups was similar. From the standpoint of cost-effectiveness the current number of 6 applications of aminofluorides is justified and optimal. This corresponds to 1.5 children aged 7–9 needed to be treated in order to avoid one decayed permanent tooth in population with a caries increment of 0.40 DMF/year and systematic supervised controlled fluoridation. Concluding, the effectiveness of frequency of 32 supervised tooth brushing was not more beneficial than brushing 6 times a year. Therefore, it is unnecessary to increase the frequency of brushing with aminofluoride gel. We should focus on the properly implementation of mandatory recommendations of preventive programs for children.

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