Clinical effects of preventive regimens for young people in their early and middle teens in relation to previous experience with dental prevention

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The clinical effects of different preventive regimens provided for young people in their early and middle teens were studied during a 2-year period. The regimens studied during the 1st year of the trial were professional tooth-cleaning plus fluoride mouth-rinsing every 3rd week versus fluoride varnish treatment every 6 months. During the 2nd year, the preventive measures were given in accordance with the estimated needs of each individual. The results were related to the individuals' previous experience with dental prevention to determine whether this had a significant influence. The results showed that fairly good or excellent effects on the individuals' oral hygiene and gingival status were readily achieved and maintained with a professional tooth-cleaning plus fluoride mouth-rinsing regimen. The study failed to demonstrate any superior caries-preventive effect of the fluoride varnish treatments. Subsequent individualized prevention produced similar average end results in all groups. Differences in the results in accordance with the individuals' previous experience with dental prevention indicate a superior and prolonged influence on dental health of professional tooth-cleaning plus fluoride mouth-rinsing in comparison with a fluoride-based program alone.
☐ *Caries; gingivitis; public dental health; school children*

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Although efforts have been made over many years to obtain good dental health in children and adolescents (1–3), opinions still differ widely as to what preventive measure(s) should be applied. Even when identical preventive principles have been used, differences in the results of similar projects have sometimes been considerable (4, 5). Factors influencing the efficacy of a certain preventive program are therefore continuously being analyzed (5–9).

To obtain more information about the benefits to the individual of different preventive programs, it may be of value to direct further attention to the professional and personal contribution to the results, in particular with regard to mechanisms of proper dental health behavior. Thus, whether a prolonged effect will be obtained when a preventive program is discontinued or replaced by other measures is still the subject of uncertainty and controversy (10, 11).

The aims of the present investigation were to study the clinical effects of different preventive regimens in young people in their early and middle teens and to relate the results to the individuals' previous experience with dental prevention.

Materials and methods

Background

In 1974 more than 1100 school children, aged 7–16 years, within the Munkhagen school area in Linköping, Sweden, volunteered to take part in a dental health care project, which was designed to study the effect of systematic plaque control on the occurrence of plaque, gingivitis, and caries during their period of attendance at the comprehensive school. A preventive program comprising oral hygiene training, professional tooth-cleaning, and topical fluorides was carried out by seven specially trained dental nurses every 3rd week during the autumn and spring terms. A corresponding number of school children from the Österberga school area received a preventive pro-

gram comprising regular mouth-rinsing every 2nd week with 0.2% sodium fluoride solution. The children's parents were thoroughly informed about the objectives of the study, but no particular emphasis was placed on their cooperation. The teachers' support was guaranteed by the school management.

The children in the third and fourth grades, aged 9–11 years at the start of the project, formed groups for annual examination: an experimental group at the Munkhagen school and a comparison (control) group at the Österberga school, both areas belonging to low-fluoride regions (<0.4 parts/10^6F^-). In 1977, following the completion of 3 years of the field trial, the group of children who had received systematic plaque control showed a reduction of plaque, gingivitis, and caries by 59%, 73%, and 51%, respectively, in comparison with the controls (12).

Present investigation

In 1978 the design of the project was changed, and new base-line examinations were carried out in the same schools, this time in those children who by then belonged to the seventh and eighth grades (Table 1). The classes were divided at random into approximately equal halves at both the Munkhagen and the Österberga schools. Two groups were thereby formed at each school, receiving different preventive regimens during the 1st year of the trial; one group, group I, was assigned to professional tooth-cleaning plus fluoride mouth-rinsing, and the other group, group II, underwent a fluoride varnish program. Different nurses, specially trained for these tasks (12), carried out the preventive regimens at the two schools.

Professional tooth-cleaning was performed every 3rd week. At each session, instruction in oral hygiene and training in the use of the toothbrush and dental floss were given. The teeth were cleaned with rotating rubber cups, bristles, and dental floss, using a fluoridated polishing paste (Acta®, Playtex-Wallco, Sweden). The sessions ended with mouth-rinsing with a 0.2% sodium fluoride solution.

The fluoride varnish treatments, carried out in accordance with established clinical routines every 6 months (13), consisted of an initial professional tooth-cleaning session, using pumice as an adjunct. After being rinsed with water, the teeth were coated with Duraphat® (Woelm, Eschwege, FRG), using a cotton swab plus dental floss in the proximal areas. The patients were advised to avoid eating for 4–6 h.

During the 2nd year of the trial, the type and scope of the preventive measures were decided in accordance with each individual's need. This was estimated by the dental officer, the dental hygienist, and the prophylactic dental nurse, in accordance with each individual's caries incidence and prevalence of plaque and gingivitis.

Each individual received fluoride varnish (Duraphat) treatment after professional cleaning of the teeth once every school term. These sessions were occasionally repeated so that individuals with presumed high caries risk could receive a maximum of four treatments during this year of the trial. Moreover,

Table 1. Age and sex distribution at the investigated schools in accordance with year and grade, the 2-year participants of the 7th grade (at base line) and the 1-year participants of the 8th grade (at base line)

Year	Grade	Age, years	Munkhagen school (no.)			Österberga school (no.)		
			Boys	Girls	Total	Boys	Girls	Total
1978 (base line)	7	13–14	32	46	78	37	39	76
	8	14–15	34	34	68	38	35	73
1979 (1st year)	8	14–15	31	43	74	36	38	74
	9	15–16	30	32	62	37	33	70
1980 (2nd year)	9	15–16	28	41	69	35	36	71

Table 2. Diagnostic criteria for radiographic caries

Code	Diagnosis	Criteria
30	Initial radiographic caries	Carious lesion in the outer 1/3 of the enamel thickness
31	Initial radiographic caries	Carious lesion past the outer 1/3 but not exceeding 2/3 of the enamel thickness
32	Manifest radiographic caries	Carious lesion exceeding 2/3 of the enamel thickness but not reaching the dentine
33	Manifest radiographic caries	Carious lesion extending into the dentine

oral hygiene training was routinely given and repeated at a maximum of four sessions with the aim of establishing proper oral hygiene techniques in each individual.

Examinations

As a measure of the oral hygiene status, the plaque prevalence was calculated from the number of tooth surfaces that, after staining with erythrosine, showed continuous plaque in the cervical region (5). The gingival status was described in terms of gingivitis prevalence, calculated by assessing the number of gingival units with signs of inflammation—that is, bleeding on probing (5). Both plaque and gingivitis assessments were confined to the regions of the first molars and incisors—48 surfaces or units per individual.

The caries status was assessed by clinical and radiographic recording of decayed and filled surfaces (DF-S) of all permanent teeth except third molars (15). Posterior bite-wing radiographs were taken with a parallel long-cone technique. The diagnostic criteria outlined by Koch (16) were used. The investigators were trained in the interpretation and use of these criteria (12). In addition, the proximal carious lesion was further classified by a subdivision into four consecutive stages, the first two denoting initial radiographic caries (Codes 30 and 31) and the last two manifest radiographic caries (Codes 32 and 33) (Table 2).

The following data were used to describe caries status: (i) surfaces at risk and DF-S prevalence at base line; (ii) DF-S incidence at the annual recordings to comprise new manifest or restored clinical caries and new initial or manifest radiographic caries; and (iii) caries progression for the annual stepwise increase of any of the stages of initial and manifest radiographic caries.

Diagnostic error

Duplicate recordings (by L-Å. Johansson) of the gingival and caries status were carried out in one randomly selected class (no. = 24) 1–2 weeks after the base-line examinations. The reproducibility was 60.2% for the

Table 3. The 2-year participants. Plaque prevalence ($\bar{x}$; SEM) by year, grade, and preventive regimen of groups I and II. Maximum score, 48

		I. Prof. tooth-cleaning (78–79) and individualized prevention (79–80)			II. Fluoride varnish (78–79) and individualized prevention (79–80)		
Year	Grade	Munkhagen	*P*	Österberga	Munkhagen	*P*	Österberga
1978 (base line)	7	8.4 ± 1.5	<0.001	30.0 ± 2.0	13.4 ± 1.4	<0.001	29.1 ± 1.9
1979 (1st year)	8	8.8 ± 1.3	<0.05	14.0 ± 1.6	19.3 ± 2.0	<0.05	26.2 ± 2.0
1980 (2nd year)	9	18.3 ± 2.1	NS	18.9 ± 1.9	17.8 ± 1.9	NS	17.6 ± 1.8

Table 4. The 2-year participants. Gingivitis prevalence ($\bar{x}$; SEM) by year, grade, and preventive regimen of groups I and II. Maximum score, 48

		I. Prof. tooth-cleaning (78–79) and individualized prevention (79–80)			II. Fluoride varnish (78–79) and individualized prevention (79–80)		
Year	Grade	Munkhagen	*P*	Österberga	Munkhagen	*P*	Österberga
1978 (base line)	7	5.3 ± 1.4	<0.001	22.6 ± 2.5	10.4 ± 1.9	<0.001	22.1 ± 2.0
1979 (1st year)	8	6.6 ± 1.4	NS	8.6 ± 1.7	13.0 ± 2.0	NS	18.4 ± 2.2
1980 (2nd year)	9	12.3 ± 2.1	NS	8.9 ± 1.4	14.0 ± 2.0	NS	10.1 ± 1.5

gingivitis and 92.6% for the caries recordings.

Statistical analysis

The Mann–Whitney–Wilcoxon test was used for testing significance.

Results

The 2-year participants

Oral hygiene status (Table 3). At base line, the Munkhagen subgroups, who had previously received regular professional tooth-cleaning sessions, displayed a significantly lower prevalence of plaque than those subjects who had only had fluoride mouth-rinsing—that is, the Osterberga subgroups ($P < 0.001$).

Although still statistically significant ($P < 0.05$), the differences between the group I subgroups diminished after an identical professional tooth-cleaning regimen during the 1st year of the trial. The differences between the group II subgroups were also still statistically significant ($P < 0.05$) after an identical fluoride varnish program, although likewise diminished. The common feature of the change was that a decrease in the plaque prevalence took place in the Österberga children concomitantly with an increase in the Munkhagen children.

When all subgroups received preventive care in accordance with the estimated needs of each individual during the 2nd year of the trial, the plaque prevalence increased in the group I subgroups, particularly in the Munkhagen children. A similar level of plaque prevalence was recorded in the group II subgroups but was here mainly due to a further decrease in the Österberga children. As a consequence, no significant differences could be demonstrated between any of the subgroups.

Gingival status (Table 4). At base line, the Munkhagen subgroups, who had previously received regular professional tooth-cleaning, had a significantly lower prevalence of gingivitis than the Österberga subgroups, who had been on a fluoride mouth-rinsing program ($P < 0.001$).

The difference between the group I subgroups diminished markedly after identical professional tooth-cleaning regimens during the 1st year of the trial owing to a considerable decrease in gingivitis prevalence in the Österberga children. In the group II subgroups, a slight increase in gingivitis prevalence occurred in the Munkhagen children concomitantly with a slight decrease in the corresponding children at Österberga, resulting in a small and non-significant difference in gingivitis prevalence between these subgroups.

A further increase in the gingivitis prevalence took place during the 2nd year of the trial in the Munkhagen subgroup of group I, but it was unchanged in the corresponding Österberga subgroup, resulting in similar gingival conditions in the two subgroups. In group II, a further decrease in the gingivitis prevalence was recorded in the Österberga children, whereas it remained almost unchanged in the Munkhagen children. This resulted in a small and non-significant difference between the two subgroups.

Table 5. The 2-year participants. Top: Caries status ($\bar{x}$; SEM) at base line in 1978 by the number of surfaces at risk and caries prevalence. The scores for DF-S prevalence in accordance with Koch (16) are presented in separate figures for manifest/restored caries and initial radiographic caries (15). Bottom: The annual recordings of new and restored carious lesions in accordance with Koch (16). The scores for DF-S incidence are presented in total figures ($\bar{x}$; SEM) and as their occurrence at various tooth surfaces ($\bar{x}$)

		I. Prof. tooth-cleaning (78–79) and individualized prevention (79–80)			II. Fluoride varnish (78–79) and individualized prevention (79–80)		
	Grade	Munkhagen, no. = 31	*P*	Österberga, no. = 35	Munkhagen, no. = 38	*P*	Österberga, no. = 36
Variables at base line, 1978							
Surfaces at risk	7	118.0 ± 0.9	NS	117.6 ± 1.6	114.1 ± 1.6	NS	112.5 ± 1.1
DF-S prevalence	7						
Manifest and restored caries		8.6 ± 0.9	NS	7.6 ± 0.9	12.4 ± 1.3	NS	12.3 ± 0.8
Initial radiographic caries; Code 30		2.9 ± 0.6	NS	2.9 ± 0.6	2.1 ± 0.4	NS	1.9 ± 0.3
Initial radiographic caries; Code 31		1.7 ± 0.4	NS	1.1 ± 0.4	1.9 ± 0.4	NS	1.1 ± 0.3
Variables at annual recordings							
DF-S incidence 1979	8	1.6 ± 0.3	NS	2.0 ± 0.3	2.4 ± 0.4	NS	3.7 ± 0.6
Proximal		0.8		0.7	1.3		1.8
Buccal + lingual		0.3		0.2	0.7		0.8
Occlusal		0.6		1.0	0.3		1.2
DF-S incidence 1980	9	2.2 ± 0.4	NS	2.2 ± 0.4	2.3 ± 0.4	NS	2.3 ± 0.4
Proximal		0.8		1.0	0.9		1.0
Buccal + lingual		0.3		0.1	0.6		0.9
Occlusal		1.2		1.0	0.8		0.4

Caries status (Tables 5–7). At base line, there were no statistically significant differences in surfaces at risk or DF-S prevalence between the group I or the group II subgroups of the 7th graders (Table 5). At both schools, the number of surfaces at risk was significantly lower in the subgroups randomly assigned to fluoride varnish application than in the subgroups assigned to professional tooth-cleaning ($P < 0.05$).

Table 6. The 2-year participants. Frequency distribution, using class intervals of DF-S incidence, for individuals with new and restored carious lesions at the annual examinations

			I. Prof. tooth-cleaning (78–79) and individualized prevention (79–80)		II. Fluoride varnish (78–79) and individualized prevention (79–80)	
Year	Grade	DF-S incidence	Munkhagen, no. = 31	Österberga, no. = 35	Munkhagen, no. = 38	Österberga no. = 36
1978–79	8	0	8	11	12	8
		1–3	19	16	15	12
		4–6	3	8	7	9
		≥7	1	0	4	7
1979–80	9	0	8	13	9	9
		1–3	15	15	20	19
		4–6	6	3	8	5
		≥7	2	4	1	3

Table 7. The 2-year participants. The scores for total proximal caries progression ($\bar{x}$; SEM) indicate the total annual stepwise increase of any of the stages for initial and manifest radiographic caries. P 1, P 2, and P 3 indicate progression by one, two, and three steps, respectively

Variables of proximal caries progression	Grade	I. Prof. tooth-cleaning (78–79) and individualized prevention (79–80)			II. Fluoride varnish (78–79) and individualized prevention (79–80)		
		Munkhagen, no. = 31	*P*	Österberga, no. = 35	Munkhagen, no. = 38	*P*	Österberga, no. = 36
Total progression 1978–79	7–8	4.0 ± 0.7	NS	3.5 ± 0.8	5.9 ± 0.8	NS	5.6 ± 0.9
P 1		2.5 ± 0.5	NS	1.8 ± 1.4	2.9 ± 0.6	NS	3.2 ± 0.5
P 2		0.7		0.7	1.0		0.9
P 3		0.1		0.1	0.3		0.2
Total progression 1979–80	8–9	4.4 ± 0.9	NS	5.1 ± 1.0	5.3 ± 0.9	NS	3.7 ± 0.6
P 1		2.5 ± 0.4	NS	2.6 ± 0.5	2.8 ± 0.5	NS	2.1 ± 0.4
P 2		0.8		1.2	0.9		0.7
P 3		0.1		0.2	0.0		0.1

Following the 1st year of the trial, in 1979, there were no statistically significant differences in caries incidence between the group I or the group II subgroups (Table 5). Nor was there any significant difference between the professional tooth-cleaning and the fluoride varnish subgroups at Munkhagen —1.6 and 2.4 new DF-S, respectively. At Österberga there were significantly more new carious lesions in the fluoride varnish subgroup, despite their having fewer surfaces at risk, than in the tooth-cleaning subgroup—3.7 versus 2.0 new DF-S ($P < 0.01$). The incidence of new carious lesions varied considerably between individuals (Table 6). A score of 0–3 new DF-S was noted in most of the children. The best results were achieved in those previously or currently receiving professional tooth-cleaning sessions, the poorest effect in those on a fluoride varnish program.

The proximal caries progression was quite similar in the group I subgroups (Table 7). The lesions mostly progressed by one step, 2.5 versus 1.8 lesions belonging to this category. The caries development was also similar in the group II subgroups; progression by one step dominated—2.9 versus 3.2 lesions. At Österberga, but not at Munkhagen, the difference between subgroups receiving different preventive regimens was statistically significant; 3.2 versus 1.8 lesions progressed by one step ($P < 0.05$). The same was true with regard to total progression; 5.6 versus 3.5 lesions progressed by one, two, or three steps ($P < 0.05$). There was a statistically significant correlation between proximal caries progression and the DF-S incidence ($r = 0.40$; $P < 0.001$).

After the 2nd year of the trial, in 1980, when prevention was given according to each individual's estimated need, there were no statistically significant differences in caries incidence between any of the subgroups studied—2.2–2.3 new DF-S in all subgroups (Table 5). A difference in caries susceptibility of various tooth surfaces was noted, in that children who had been on a professional tooth-cleaning regimen during the 1st year continued to develop new lesions only rarely on buccal and lingual tooth surfaces—0.1–0.3 new DF-S. Children who had had fluoride varnish applications as a preventive measure during the same period continued to develop approximately the same number of new lesions on these surfaces as previously—0.6–0.9 new DF-S. The caries incidence on the proximal surfaces showed no significant differences between the subgroups.

The frequency of new carious lesions in each individual also varied markedly during

the 2nd year of the trial (Table 6). A score of 0–3 new DF-S still dominated and was now almost equally common in all subgroups. The proximal caries progression was also similar in all subgroups and occurred at approximately the same rate as during the 1st year (Table 7). There was a statistically significant correlation between the proximal caries progression and the DF-S incidence this year also ($r = 0.65$; $P < 0.001$).

The 1-year participants

Oral hygiene and gingival status (Table 8). At base line, the prevalence of plaque and gingivitis in the Munkhagen subgroups was significantly lower than in the corresponding Österberga subgroups ($P < 0.001$ and 0.05). At the end of the 1-year trial, a significant difference remained between the group I subgroups ($P < 0.05$ and 0.001) but not between the group II subgroups.

Caries status (Table 8). At base line, there were no significant differences in surfaces at risk or DF-S prevalence between the group I or the group II subgroups. At the end of the 1-year trial, there were no statistically significant differences in caries incidence between the group I or the group II subgroups. In all subgroups, the buccal and lingual tooth surfaces had the lowest scores for caries incidence.

Discussion

When interpreting the results, it should be recalled that both the preventive regimens and the annual examinations for school dental care were performed at different clinics with different teams. Thus, regular dental care was provided by different dental officers, who may have applied different criteria for diagnosis of dental decay (17) and also for treatment. In particular, the indications

Table 8. The 1-year participants. The oral hygiene and gingival and caries status are presented in scores for plaque and gingivitis prevalence ($\bar{x}$, SEM; maximum score, 48) and surfaces at risk, DF-S prevalence, and incidence ($\bar{x}$; SEM), respectively. The scores for DF-S incidence are also presented in relation to their occurrence on the various tooth surfaces ($\bar{x}$)

Variable; year	Grade	I. Prof. tooth-cleaning (78–79)			II. Fluoride varnish (78–79)		
		Munkhagen, no. = 33	*P*	Österberga, no. = 37	Munkhagen, no. = 29	*P*	Österberga, no. = 33
Oral hygiene status							
1978 base line	8	8.7 ± 1.6	<0.001	28.7 ± 1.9	7.9 ± 1.9	<0.001	25.6 ± 1.8
1979	9	14.5 ± 1.8	<0.05	19.5 ± 1.4	17.7 ± 2.5	NS	19.3 ± 2.0
Gingival status							
1978 base line	8	2.7 ± 0.6	<0.001	25.6 ± 2.2	7.9 ± 2.0	<0.05	15.8 ± 2.2
1979	9	4.0 ± 0.8	<0.001	15.0 ± 1.9	11.9 ± 2.4	NS	14.0 ± 2.4
Caries status							
Surfaces at risk							
1978, base line	8	111.5 ± 1.9	NS	109.0 ± 1.6	108.9 ± 2.1	NS	112.1 ± 1.5
DF-S prevalence							
1978, base line	8	16.2 ± 1.8	NS	18.6 ± 1.6	17.9 ± 2.1	NS	15.1 ± 1.5
DF-S incidence							
1978–79	9	1.3 ± 0.4	NS	2.3 ± 0.4	2.3 ± 0.6	NS	1.6 ± 0.5
Proximal		0.8		0.8	1.2		0.5
Buccal + lingual		0.1		0.4	0.3		0.2
Occlusal		0.5		1.0	0.8		1.0

for occlusal therapy are known to vary widely among dentists. When related to the various tooth surfaces, the DF-S incidence should therefore be analyzed with caution with regard to the scores for occlusal surfaces. It cannot be precluded that differences in regular dental care or in the participating children's dietary habits and use of commercially available sources of fluorides may have influenced the results. However, these are differences that reflect some of the real-life conditions under which the results obtained in community trials may have to be evaluated (9, 18–20).

The superior effect on the oral hygiene status and on the gingival status of continued professional tooth-cleaning plus fluoride mouth-rinsing, as compared with a solely fluoride-based program, is in accordance with the reports from the Karlstad studies and other studies with a similar approach (5, 21). The similar beneficial effect in children earlier unfamiliar with, but then subjected to, professional tooth-cleaning sessions during the 1st year of the trial is thus logical.

The findings concerning the discontinued professional tooth-cleaning sessions are of particular interest. Starting from a level of fairly good oral hygiene and gingival status, the gingival conditions deteriorated only slightly and non-significantly when the professional plaque control ceased. It was evidently possible to achieve a fairly adequate level of oral hygiene with a short or long period of professional tooth-cleaning, regardless of whether the subsequent regimen was mainly fluoride-based (1st year) or related to individual needs (2nd year). This may seem to contradict the findings of Axelsson & Lindhe (22) in children of corresponding ages subjected to 18 months of fortnightly professional tooth-cleaning sessions with or without concomitant oral hygiene instruction. The authors' conclusions, based on findings from ongoing measures, were that oral hygiene training contributed hardly at all to the conditions achieved by professional tooth-cleaning. However, this need not be inconsistent with our observation that, after the discontinuation of professional tooth-cleaning sessions, the patient's active participation seems to be an essential contribution for prolonged maintenance of dental health. Moreover, the observation that the children without previous experience of professional tooth-cleaning responded well both to these sessions and to preventive regimens in accordance with their estimated needs suggests a positive and long-standing behavioral influence on the patients from such sessions.

The caries status of the children receiving similar preventive regimens did not differ significantly during the course of the study. It should be noted that the group with the highest scores for surfaces at risk at base line had a lower caries incidence after the 1st year than the group showing the opposite mean values at base line. The higher caries incidence in the latter children may be at least partly ascribed to a higher caries susceptibility, as documented at the start of the study.

However, a consistent positive association between caries prevalence and incidence in adolescents was recently reported to be predictable only in low-prevalence groups (23). In high-prevalence groups a negative association was found, possibly due to saturation with regard to caries. An inferior caries-preventive effect of the fluoride varnish regimen in individuals with high prevalence, as previously reported (13), seems to be the most plausible explanation of the present results. In addition, it cannot be precluded that the fluoride varnish may have been improperly applied or removed too early by the patients.

The significant difference between these children and those who for the first time were offered professional tooth-cleaning plus fluoride mouth-rinsing, carried out every 3rd week during the 1st year, indicates a superior short-term caries-preventive effect of such a regimen compared with fluoride varnish treatment every 6 months. A comparison of these children with those who discontinued regular professional tooth-cleaning, and were thus mainly left to self-performed oral hygiene, with addition of two fluoride varnish treatments, showed only a slight and non-significant difference. This may be in accordance with reports that self-performed oral hygiene measures alone

have not proved predictably effective in completely preventing caries (e.g. 5, 24).

The number of examined tooth surfaces often varies between different studies, which to some extent may limit a comparative evaluation. Thus, it should be noted that the DF-S scores in this study do not exclude initial radiographic caries in the figures for prevalence and incidence, although this practice is recommended for routine clinical use (15). Nevertheless, it is obvious that the various preventive regimens carried out in this study were least effective on the proximal tooth surfaces, despite the fact that flossing was routinely carried out by the professional teams and also recommended for home use. The results obtained in flossing studies, however, appear to be contradictory (25, 26), presumably because the results of preventive efforts in the proximal regions are highly dependent on the efficiency and frequency with which they are carried out (10, 22). Stronger emphasis in preventive programs on high-risk surfaces and teeth is therefore proposed as an important part of the efforts to achieve dental health (6).

To achieve this goal, a further elucidation of the professional and the personal roles for the results obtained in preventive programs would seem to be beneficial.

References

1. Frandsen A, ed. Oral hygiene. Copenhagen: Munksgaard, 1972.
2. Frandsen A, ed. Preventive dentistry in practice. Copenhagen: Munksgaard, 1976.
3. Frandsen A, ed. Dental health care in Scandinavia—achievements and future strategies. Chicago: Quintessence Publishing Co., Inc., 1982.
4. Ainamo J. Bacterial control: state of the art. J Dent Res 1980;59 (Special Issue D, Part II):2137–43.
5. Bellini HT, Arneberg P, von der Fehr FR. Oral hygiene and caries. A review. Acta Odontol Scand 1981;39:257–65.
6. Axelsson P. Concept and practice of plaque-control. Pediatr Dent 1981;3(Special Issue):101–13.
7. Faresjö T, Gamsäter G, Hamp SE, Nilsson T, Westerberg I. Influence of social factors on the effect of different prophylactic regimens. Swed Dent J 1981;5(suppl 7).
8. Fejerskov O, Thylstrup A, Larsen M Joost. Rational use of fluorides in caries prevention. A concept based on possible cariostatic mechanisms. Acta Odontol Scand 1981;39:241–9.
9. Pilot T. Analysis of the overall effectiveness of treatment of periodontal disease. In: Shanley D, ed. Efficacy of treatment procedures in periodontics. Chicago: Quintessence Publishing Co., Inc., 1980:213–31.
10. Gisselsson H, Björn AL, Birkhed D. Immediate and prolonged effect of individual preventive measures in caries and gingivitis susceptible children. Swed Dent J 1983;7:13–21.
11. Koch G, Lindhe J. The state of the gingivae and the caries-increment in schoolchildren during and after withdrawal of various prophylactic measures. In: McHugh WD, ed. Dental plaque. Edinburgh: Livingstone, 1970:271–81.
12. Hamp SE, Lindhe J, Fornell J, Johansson LÅ, Karlsson R. Effect of a field program based on systematic plaque control on caries and gingivitis in schoolchildren after 3 years. Community Dent Oral Epidemiol 1978;6:17–23.
13. Koch G, Petersson LG. Caries preventive effect of a fluoride-containing varnish (Duraphat®) after 1 year's study. Community Dent Oral Epidemiol 1975;3:262–6.
14. Axelsson P, Lindhe J. Effect of fluoride on gingivitis and dental caries in a preventive program based on plaque control. Community Dent Oral Epidemiol 1975;3:156–60.
15. Socialstyrelsen. Socialstyrelsens anvisningar för journalföringen inom folktandvården. SOSFS(M) 1977;94:5.
16. Koch G. Effect of sodium fluoride in dentifrice and mouthwash on incidence of dental caries in schoolchildren [thesis]. Odontol Revy 1967;18(suppl 12).
17. Markén KE. Studies of deviations between observers in clinicoodontological recording [thesis]. Trans R Sch Dent Stockholm and Umeå Uppsala: Almqvist & Wiksell, 1962.
18. Kristoffersen T. Evaluation of dental health programmes for adults. In: Frandsen A, ed. Dental health care in Scandinavia—achievements and future strategies. Chicago: Quintessence Publishing Co., Inc., 1982:121–7.
19. Melson B, Agerbaeck N. En evaluering af 3 forskellige profylakse-projekter udført i en kommunal børnetandpleje. Tandlaegebladet 1980;84:45–50.
20. O'Mullane DM. Efficiency of clinical trials of caries, preventive agents and methods. Community Dent Oral Epidemiol 1976;4:190–4.
21. Axelsson P. The effect of plaque control procedures on gingivitis, periodontitis and dental caries. [Thesis]. Gothenburg: University of Gothenburg, 1978.
22. Axelsson P, Lindhe J. Effect of oral hygiene instruction and professional toothcleaning on caries and gingivitis in schoolchildren. Community Dent Oral Epidemiol 1981;9:251–5.
23. Rise J, Haugejorden O, Birkeland JM. Relationship between caries prevalence and incidence among adolescents. Community Dent Oral Epidemiol 1982;10:340–4.
24. Axelsson P, Lindhe J, Wäseby J. The effect of various plaque control measures on gingivitis and caries in schoolchildren. Community Dent Oral Epidemiol 1976;4:232–9.

25. Granath LE, Martinsson T, Matsson L, Nilsson G, Schröder U, Söderholm B. Intraindividual effect of daily supervised flossing on caries in schoolchildren. Community Dent Oral Epidemiol 1979;7:147–50.

26. Wright GZ, Banting DW, Feasby WH. The Dorchester dental flossing study: final report. Clin Prev Dent 1979;1:23–6.

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