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SELF-PREPARATION SnF₂ PROPHYLACTIC TECHNIQUE IN
PREVENTIVE DENTISTRY — REPORT AFTER ONE YEAR

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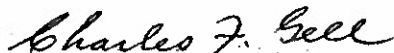
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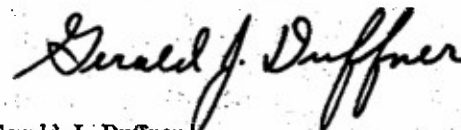
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SUMMARY PAGE

PROBLEM

To evaluate the effectiveness of the self-preparation technique as part of the three-agent SnF₂ treatment in preventive dentistry.

FINDINGS

After one year the self-preparation technique as the prophylactic phase of the three-agent SnF₂ treatment was found to be as effective as the operator-applied technique as a caries preventative.

APPLICATIONS

Encouraged by the findings of this and earlier studies, the U. S. Navy Dental Corps is already embarked in bringing this preventive dentistry treatment to all U. S. Navy and Marine Corps personnel.

ADMINISTRATIVE INFORMATION

This investigation was conducted as a part of Bureau of Medicine and Surgery Research Work Unit MR005.19-6027—Self Applied Stannous Fluoride Prophylactic Technique in Preventive Dentistry. This report, which is Report No. 1 on the Work Unit, was approved for publication on 28 February 1968, as Memorandum Report No. 68-3. Much of the material contained in this report will be presented at the Annual Meeting of the International Association for Dental Research, in San Francisco, California, on 22 March 1968.

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INTRODUCTION

The literature abounds with firm evidence of the cariostatic effectiveness of stannous fluoride. In earlier reports from this laboratory such effectiveness was documented by data from a study^{1,2} on a male young adult population in which the SnF₂ was employed in a combination of treatment methods: (1) In a compatible lava pumice prophylactic paste; (2) In an aqueous topical solution application; and (3) In a dentifrice for daily home use. These findings were in keeping with the findings of Muhler,³ Bixler,⁴ Gish et al.⁵ who used the same combination of treatment methods employing SnF₂ in their reported studies.

While the results of the study we conducted on Navy personnel were gratifying to the U. S. Navy Dental Corps, the time involved in accomplishing this three-pronged SnF₂ preventive dentistry treatment was such that it seemed hardly possible to render this treatment without substantially reducing other facets of total dental treatment. Since the Navy Dental Corps is charged with the dental care and oral health of the combined Navy-Marine Corps personnel (some 1,000,000 men), the implementation of the three-agent SnF₂ treatment program servicewide would be too costly in man hours of treatment time. The time consuming aspect of the three-agent SnF₂ treatment lies in the prophylaxis phase, which is accomplished on a one-to-one basis — one patient — one operator — which requires upwards of 30 minutes to be accomplished. If a technique could be evolved which would substantially reduce the prophylaxis time expended without seriously impairing the cariostatic effectiveness of the three-agent SnF₂ treatment, then of course this treatment could be made available to all Navy and Marine Corps personnel without cutting back on other facets of total dental treatment.

In a feasibility study, Foster⁶ indicated

the possibility that properly oriented individuals might accomplish the tooth polishing or prophylaxis phase of the three-pronged treatment method upon themselves. In this fashion, a large group of men under the supervision and guidance of one dental officer or one dental technician could prepare their own teeth surfaces for the reception of the liquid topical application in the same elapsed time as the one man-one operator prophylactic technique employed in the earlier study.¹ The purpose of the current study, therefore, is to evaluate the cariostasis obtained from a SnF₂ self-polishing (self-preparation) technique as compared with an operator-applied SnF₂ prophylaxis technique as part of the three-agent SnF₂ treatment method in preventive dentistry.

MATERIALS AND METHODS

Subjects selected for this study were U. S. Navy enlisted men, 18 to 22 years of age, who had evidence of active caries lesions and who had no previous exposure to topical SnF₂ applications. They were examined clinically and with a series of five bite-wing roentgenograms, initially and at six month intervals by a single examiner. The subjects were randomly distributed into five groups: Two comprising the operator-applied technique as reported previously^{1,2} and three groups comprising the self-prepared technique. The treatment schedule, initially and at 12 months, consisted of: (1) The prophylaxis phase — the application of 8.9% SnF₂ in a compatible lava pumice paste either by the operator or by the "self-prepared" method; (2) The topical phase — the application of 10% SnF₂ aqueous solution to the dried tooth surface for a minimum of 15 seconds; and (3) The home care phase — the provision for the daily use of a dentifrice containing 0.4% SnF₂. In an attempt to maintain uniform procedures, those subjects denied SnF₂ treatments were provided identical treatment procedures with appropriate

placebo preparations containing sodium chloride as a substitute for stannous fluoride in the prophylaxis paste and in the topical solution. Since the experimental and control dentifrices were identical except for the presence or absence of the stannous fluoride, and since they were indistinguishable by appearance and taste, sodium chloride was not added to the control dentifrice.

EXPERIMENTAL DESIGN

The experimental design is shown in Table 1.

Table 1
Self-Preparation SnF₂ Prophylactic
Technique in Preventive Dentistry
Experimental Design

Group	1st Stage	2nd Stage	3rd Stage
A*	Prophy paste +8.9% SnF ₂	10% aqueous SnF ₂ topical	Dentifrice + .4% SnF ₂
B*	Prophy paste +NaCl	Aqueous NaCl topical	Dentifrice -SnF ₂
C**	Prophy paste +8.9% SnF ₂	10% aqueous*** SnF ₂ topical	Dentifrice + .4% SnF ₂
D**	Prophy paste +NaCl	Aqueous NaCl topical	Dentifrice -SnF ₂
E**	Prophy paste +8.9% SnF ₂	10% aqueous SnF ₂ topical	Dentifrice + .4% SnF ₂

*Group A and B—1st stage is operator-applied.

**Group C, D and E—1st stage is self-prepared.

***Aqueous topical taped interproximally with unwaxed floss.

Group A received the total SnF₂ treatment: 8.9% SnF₂ in a compatible lava pumice prophylaxis paste, operator-applied; a 15 second 10% aqueous SnF₂ topical application, and a dentifrice for home use containing 0.4% SnF₂. Group B received the same treatment routine except for the absence of SnF₂ in all three phases of treatment. Group C received the same treatment schedule as Group A, except that the prophylaxis phase was self-applied. Group D received the same treatment as Group C, except for the absence of SnF₂ in all three phases of treatment. Group E received the same treatment as did Group C except that there was no taping of the interproximal surfaces with unwaxed floss. The technique for applying the prophylaxis paste (operator-applied) and the aqueous topical applications have previously been described by Dudding and Muhler.⁷ The self-preparation technique as employed in this study is as follows:

"The prophylactic paste is placed on the toothbrush and the buccal or facial surfaces of one quadrant are brushed with an occlusal ward stroke for one minute, care being exercised to keep away from the gingiva. This is continued for one minute from the most posterior tooth to the midline. More paste is picked up and the lingual surfaces of the same quadrant are brushed in the same fashion for one minute. Again, more paste is picked up and the occlusal surfaces are brushed for one-half minute with a back and forward stroke. The subject may then rinse, balloning out the cheeks to prevent the trapping of the paste. The process is repeated for the other quadrants—two and a half minutes for each quadrant, 10 minutes of brushing time in all."

No attempt was made to change the oral hygiene habits of the subject. He received no special home care instructions. He was merely asked to use the coded dentifrice continuously supplied him with the same frequency and application method he had employed with his former dentifrice. He was also continuously supplied with three row medium nylon bristled toothbrushes.

RESULTS AND DISCUSSION

The initial balance as to age and past caries experience for the subjects who completed 12 months in the study and who were available for re-examination and re-treatment are shown in Table 2. The mean age ranged from 20.39 years to 20.59 years. The chi square test applied to these age distributions revealed no significant differences between groups. The t test applied to the initial differences between each experimental group and its control revealed no significant differences in either DMFT or DMFS indices.

Table 2
Initial Balance of Subjects Completing
12 Months of Study

Group	Age	Mean	
		DMFT	DMFS
A	20.59	15.03±.662	39.14±2.506
B	20.44	14.89±.594	39.73±1.920
C	20.55	14.05±.546	36.53±1.921
D	20.40	15.23±.504	38.83±1.875
E	20.39	15.02±.594	40.41±2.017

Table 3 shows the DMFT and DMFS increments for those subjects who completed 12 months of study. Statistical analysis revealed lesser DMFT and DMFS increments for each of the experimental groups when compared with their respective control group. In the groups where the prophylaxis paste was operator-applied the lesser increment of the experimental Group A compared with its control, Group B may be expressed as a 66% and a 53% reduction in the caries attack rate for the DMFT and DMFS respectively. In the groups where the prophylaxis paste was self-applied, the lesser DMFT and DMFS increments for the experimental Groups C and E compared with their control Group D reflect a 52% and 58% DMFT reduction respectively and a 50% and 49% DMFS reduction respectively in the caries attack rate.

Table 3
DMFT and DMFS Increments for Subjects who Completed 12 Months in the Study

Group	N	DMFT Increment	% Reduction	DMFS Increment	% Reduction
A	86	.31±.123	66	1.22±.202	53
B	82	.90±.137	—	2.59±.171	—
C	119	.30±.093	52	1.28±.205	50
D	98	.62±.105	—	2.55±.264	—
E	102	.26±.090	58	1.29±.192	49

Table 4
Probabilities as Shown by t test for Subjects who Completed 12 Months in the Study (numerical t values given)

Variable	DMFT Increment	DMFS Increment
A vs B	3.21**	5.18***
A vs C	N.S.	N.S.
A vs D	1.91	3.99***
A vs E	N.S.	N.S.
B vs C	3.63***	4.91***
B vs D	1.62	N.S.
B vs E	3.90***	5.06***
C vs D	2.28*	3.79***
C vs E	N.S.	N.S.
D vs E	2.60*	3.84***

Legend *P<.05 **P<.01 ***P<.001

As can be seen in Table 4 the application of the t test shows significant differences between the mean increments of the experimental and the control groups, the significance being of a high order, P<.001 for DMFS and of lesser magnitude for DMFT.

The differences between experimental Groups A-C, A-E and C-E are not significant nor are the differences between the Control Groups B-D. At this stage of the study there is no significant difference between experimental Groups C and E. Should this trend of no significant difference continue, a further economy in time may be realized by the elimination of time expended in the interproximal taping with unwaxed floss which was accomplished in Group C but not in Group E. At this stage too, it appears that the self-prepared method for the prophylaxis phase is as effective as is the operator-applied prophylaxis phase of the three-agent SnF₂ treatment method in preventive dentistry.

SUMMARY

The cariostatic effectiveness of the three-agent SnF₂ treatment method in preventive dentistry, utilizing a self-prepared prophylaxis technique, was studied in young adult male Naval personnel. After 12 months, statistical analysis of the data reveals:

A. Significant reductions in the DMFT and DMFS increments of the experimental over the control groups; and,

B. That the self-prepared prophylaxis technique is as effective as the operator-applied prophylaxis technique; and

C. A substantial saving in time could be realized by the substitution of the self-prepared prophylaxis phase for the operator-applied prophylaxis phase of the three-agent SnF₂ treatment method in the Navy's Preventive Dentistry Program.

REFERENCES

1. Scola, F. P. and Ostrom, C. A. Clinical evaluation of stannous fluoride in naval personnel. I.A.D.R. Abstract, July 1965.
2. Scola, F. P. and Ostrom, C. A. Clinical evaluation of stannous fluoride when used as a constituent of a compatible prophylactic paste, as a topical solution, and in a dentifrice in naval personnel. 1. Report of findings after first year. J.A.D.A., 73(6):1306-1311, Dec 1966.
3. Muhler, J. C. Practical method for reducing dental caries in children not receiving the established benefits of communal fluoridation. J. Dent. Child. 28:5, 2nd quart., 1961.
4. Bixler, David, and Muhler, J. C. Effect on dental caries in children in a nonfluoride area of: combined use of three agents containing stannous fluoride: a prophylactic paste, a solution and a

- dentifrice. J.A.D.A., 68:792 June, 1964.
5. Gish, C. W., and Muhler, J. C. Effect on dental caries in children in a natural fluoride area of combined use of three agents containing stannous fluoride: a prophylactic paste, a solution and a dentifrice. J.A.D.A., 70: 914 April, 1965.
 6. Foster, R. D. Self application of topically applied stannous fluoride: a feasibility study. J.A.D.A., 70(2):329-333, Feb 1965.
 7. Dudding, N. J., and Muhler, J. C. Technique of application of stannous fluoride in a compatible prophylactic paste and as a topical agent. J. Dent. Child. 29:219, 4th quart., 1962.

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13. ABSTRACT <p>The topical application of stannous fluoride to the teeth of military personnel has been shown to significantly reduce the dental decay rates of the men so treated. The time spent by the dentist in polishing the teeth for this treatment is so great, however, that these applications could not be given to all Naval personnel. A method whereby the individual polishes his own teeth under supervision has been evaluated and the results after one year indicate significant decay reductions comparable to that seen in men who received the entire treatment from the dentist. The new self-preparation method should enable every man in the Naval service to receive the benefits of topical stannous fluoride treatment.</p>		

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