

THE EFFECT OF TOPICAL FLUORIDE ON DENTAL CARIES EXPERIENCE IN ADULT FEMALES OF A MILITARY POPULATION

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INTRODUCTION

SIGNIFICANT reductions in caries activity have been reported by several investigators following the topical application of fluoride.¹⁻³ Positive results were obtained in studies on children when treated mouth quadrants were compared with untreated quadrants in the same individuals.

Arnold, Dean, and Singleton⁴ observed no reduction in caries activity when whole mouth treatments were applied to adults in a military population. This has been attributed to the fact that the latter investigators used an acidulated fluoride solution and that the applications were made at one sitting. Rickles and Becks³ failed to observe a reduction in caries activity when mouth quadrants of an adult population were treated with acidulated solutions, whereas positive results were obtained in similar age groups when a neutral solution was used. Klinkenberg and Bibby¹ showed positive results in young adults with neutral fluoride solutions. These investigators emphasized the fact that their experimental group was small, the neutral fluoride having been tried in twenty-five individuals and the acidulated in twenty-two. Recently Kutler and Ireland⁵ reported no significant reductions in the dental caries experience of 147 adults when quadrants were treated with a neutral 2 per cent sodium fluoride solution.

The study to be reported is concerned with a female military population (WAVES) who received full mouth treatments with a neutral 2 per cent sodium fluoride solution.

METHODS AND MATERIALS

Two hundred seventy-enlisted servicewomen (WAVES), at the Great Lakes Naval Training Center, volunteered for this study in the fall and winter of 1951-1952. Their ages ranged from 19 to 39 years, with an average age of 22 years. Their place of birth and residence for the first eight years of their lives was distributed among thirty-two states, two possessions, and the District of Columbia. Of the total initially examined, 148 were available for a final examination in the winter of 1952-1953. The number of persons initially examined for this study was reduced by their transfer to other duty stations or by release to inactive status. Sixty women in this group had received fluoride treatments and eighty-eight were treated with a placebo solution. More than one-half of these individuals in the experimental group received four successive treatments, while the remaining received three or less, and only five received one treatment.

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Carious teeth, filled surfaces, and missing teeth were noted clinically with a mouth mirror and explorer. This information was recorded by a modified coded system supplied by the United States Public Health Service. The outline permitted scoring of various surfaces of each tooth, anomalies, fluorosis, and, to a limited degree, other defects.

Full month roentgenograms, plus four bite-wing films, were taken on each individual. The gingivae were charted after the method of Massler, Schour, and Chopra.⁶ This latter material will be the subject of additional reports. Pre- and postclinical examinations and interpretations of the roentgenograms were made by the same person. Cross-checking was conducted by an investigator apart from this study.

Each individual submitted at least two fasting saliva samples for bacteriologic examination before and after the period of this study. The laboratory procedures included plating the saliva on tomato juice agar as described by Jay and Arnold.⁷

The test group was treated with a neutral solution of 2 per cent sodium fluoride and the control group with a placebo containing 0.9 per cent sodium chloride. Treatment schedules were made at random on alternate individuals.

The clinical technic employed for the application of the solutions was as follows: (1) A thorough prophylaxis was given followed by a water rinse. (2) The teeth were isolated with cotton rolls and a saliva ejector was used. (3) The previously dried teeth were sprayed with the test solution. (4) The teeth were kept moist for the next five minutes by repeated swabbing of all tooth surfaces, with the particular solution being tested. (5) The teeth were then allowed to air dry for four minutes, after which the mouth was rinsed with water. Subsequent semiweekly applications were not preceded by a prophylaxis.

RESULTS

There was a range of eight to fourteen months' lapse between the initial and final examinations. The majority of persons included in this study were in the 21-year-old age group; their duty and environment were similar except for periods of leave.

There was no significant variation in average number of newly decayed teeth in persons receiving one, two, three, and four treatments of topical sodium fluoride.

The bacteriologic studies showed that high salivary lactobacillus counts were associated with high caries activity. It was evident that exceptions prevailed in both instances, a point not warranting discussion here. The influence of the fluoride ion on the lactobacillus counts was not demonstrable when samples were analyzed on termination of this study. Similar fluctuations in the average bacterial counts were observed in the control and experimental groups.*

New carious teeth were tabulated and the resultant figures subjected to statistical analysis (Tables I and II). Carious tooth surfaces were also noted but were not used in this paper.⁹ The per cent of WAVES developing new carious teeth during the study was 60 per cent in the group receiving sodium fluoride, as compared to 68 per cent in the control group.

*Subject of future publication.

TABLE I

DISTRIBUTION OF NEWLY DECAYED TEETH AMONG SIXTY WAVES RECEIVING SODIUM FLUORIDE TREATMENT AND EIGHTY-EIGHT RECEIVING PLACEBO (SODIUM CHLORIDE)

NO. NEWLY DECAYED TEETH PER PERSON	SODIUM FLUORIDE NUMBER OF WAVES	PLACEBO NUMBER OF WAVES
0	24	28
1	23	36
2	7	17
3	5	5
4	0	0
5	1	2
Total	60	88

Mean newly decayed teeth per person 0.950 1.079
 Standard deviation 1.064 1.046
 Standard deviation of mean 0.141 0.112
 Standard error of the difference in means $\sqrt{(0.14)^2 + (0.11)^2} = 0.178$
 Dev. = 0.724 = 1.079
 Sigma

Probability of obtaining an equal or larger deviation = 48 per cent; this is not statistically significant.

TABLE II

THE TOTAL NUMBER OF INITIALLY CARIES-FREE TEETH AND NEWLY DECAYED TEETH IN SIXTY WAVES RECEIVING SODIUM FLUORIDE AND EIGHTY-EIGHT RECEIVING A PLACEBO (SODIUM CHLORIDE)

	CARIES-FREE TEETH	NEWLY DECAYED TEETH	PER CENT NEWLY DECAYED TEETH
Sodium fluoride	1,165	57	4.89
Placebo group	1,765	95	5.38
Total	2,930	152	5.19

5.38 per cent - 4.89 per cent = 0.49 per cent difference.
 0.49 per cent ÷ 5.38 per cent × 100 = Per cent reduction of 9.1

The effect of sodium fluoride on the inhibition of newly decayed teeth per person is presented in Table I. The average number of newly decayed teeth per person was 0.95 for the fluoride subjects and 1.08 for those receiving the placebo. The comparison of the difference between these two means is not considered statistically significant ($\frac{\text{Dev.}}{\text{Sigma}} = 0.724$). The per cent reduction of the average number of newly decayed teeth in the sodium fluoride over the placebo group is 12 per cent ($\frac{1.079 - 0.95}{1.079} \times 100$). Calculation of this difference in terms of percentage reduction is 9.1 per cent (Table II). Since Table I reveals no significance, this percentage reduction is considered to be of no consequence.

SUMMARY

Sixty Navy enlisted women were treated topically with 2 per cent neutral sodium fluoride, and eighty-eight controls with sodium chloride. Two tables are presented to show the results of this form of treatment. There was no significant reduction in caries incidence of persons receiving a sodium fluoride solution over those receiving a placebo. The salivary lactobacillus counts were not affected by this form of treatment.

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