

A Comparative Evaluation of the Scrub and Bass Methods of Toothbrushing with Flossing as an Adjunct (In Fifth and Sixth Graders)

EMERSON ROBINSON, DDS, MPH

Abstract: The Scrub and Bass Methods of toothbrushing with flossing as an adjunct were evaluated to determine which is most effective in eliminating or reducing plaque and gingivitis in 5th and 6th grade school children. Three hundred and eleven children were randomly selected and placed in five groups (Scrub, Scrub-Floss, Bass, Bass-Floss, Comparison). Four Method groups went through four weeks of daily

supervised toothbrushing with four dental hygienists, while the Comparison group received no supervised instructions. There was a marked effect on oral hygiene and gingival conditions at the end of the experimental period in all four groups with no one method superior to another. Peer group intercommunication probably accounts for the improvement in the comparison group. (Am J. Public Health 66:1078-1081, 1976)

Introduction

The public's use of preventive procedures to maintain optimal oral health is a major concern of the dental profession. An essential element in a preventive dental program, for both the individual and the group, is a well organized plaque control program. Assuming that toothbrushing and flossing play a vital role in an effective plaque control program, good oral hygiene would be dependent upon the effectiveness of the particular method and the ease with which the procedure is carried out. This study was undertaken to evaluate the respective effectiveness of the Scrub and Bass Methods* with flossing as an adjunct, taught and performed within the classroom setting.

Address reprint requests to Dr. Emerson Robinson, Associate Professor, Department of Community Dentistry, School of Dentistry, The University of Michigan, Ann Arbor, MI 48109. This paper, submitted to the Journal February 12, 1976, was revised and accepted for publication July 30, 1976.

***Scrub Method**—The brush is held firmly against the teeth with the bristles pointed at right angles to the surface. The brush is then rotated with small circular motions while the brushing action progresses gradually from the posterior to the anterior teeth. A soft-textured nylon toothbrush is used.

Bass Method—A soft-textured nylon toothbrush is also used. Bristles are directed apically (toward the root) at a 45 degree angle to the long axes of the teeth. Bristles are permitted to flex and fan out, over, and under the gingival margin while the brush is moved short distances and "jiggled" and "shimmied".

Background

A review of the literature reveals no conclusive evidence concerning the relative effectiveness in eliminating plaque and gingivitis by one toothbrushing technique versus another. In 1971 Kropf¹ stated that the modified Bass Method and modified Scrub Method seemed to be the methods most commonly recommended, but did not provide evidence to substantiate the choice of one technique over the other.

Generally, there is little controversy in the literature over the existence of a positive correlation between the degree of plaque accumulation and the condition of the gingiva. Theilade, Løe, and Jensen² reported a study which documented a relationship between plaque formation and the clinical signs of gingivitis, emphasizing the reversible effect that results with the reinstatement of oral hygiene measures. The effects of toothbrushing alone, with waxed dental floss as an adjunct, and with unwaxed dental floss as an adjunct were studied by Hill, et al,³ in 1973. Their results showed, initially, that supplementing toothbrushing with dental floss resulted in added cleansing and improvement of the gingival condition, but that after three experimental periods there were no significant differences in the reduction of interdental plaque and interdental gingival inflammation produced by toothbrushing alone or by toothbrushing followed by the use of floss, either waxed or unwaxed.

McCauley's study⁴ in 1955 involved two groups of children, predominantly of the 5th grade. One group contained 491 boys and girls who received a month-long course of instruction in dental health, including a series of practice periods during which they brushed their teeth in the classroom.

The other group, serving as the comparison, consisted of 263 boys and girls who were given no instruction in dental health or toothbrushing. It was concluded that upper elementary grade children, given a four-week course of instruction in dental health that included brushing the teeth in the classroom, exhibited an improved general state of dental and oral cleanliness over a period up to five months after the close of instruction. Similarly aged children who did not receive dental health instruction also showed improvement, but of a somewhat lesser order.

Lindhe and Koch,⁵ in 1966, studied the effect of supervised oral hygiene on the gingiva in a group of school children 12 to 13 years of age. The subjects were divided into one experimental group and one control group, each with 32 children. This study revealed that daily supervised brushing considerably reduced the prevalence and severity of gingivitis in an experimental group compared with a control group.

Materials and Methods

A month-long study was carried out by a staff of two dentists and four dental hygienists on 311 fifth and sixth grade pupils within the same school district, all residing in the same community. The subjects were 12 and 13 years of age, randomly assigned to the five study groups, comprised of 148 females and 163 males.

The first step in the study was to record the gingival condition of each subject by means of the Gingival Index system (GI) proposed in 1963 by L oe and Silness.⁶ Assessments of plaque were made by a Patient Hygiene Performance (PHP) index system proposed by Podshadley and Haley.⁷ Disclosing tablets were not used at this time because there was no assurance that it was plaque that would be stained. Calculus was not included in the assessment. Pre- and post-examinations were performed by two calibrated dentists‡ at the schools using portable dental lights.

On the first day of actual instruction, the dental hygienists on the staff of the project divided each class into four groups of five or six members each and used a fifth as a comparison (no instruction) group. Each participant in the first four groups was provided two toothbrushes, one to be used during the periods of supervision and one to be used at home. Those in the groups using dental floss were supplied with two containers each of unwaxed floss. Participants in the comparison group were provided with one toothbrush.

After executing the toothbrushing (and flossing) movements under the supervision of the hygienists, the individual examined his/her mouth for remaining plaque by utilizing a disclosing tablet and the combined aids of mouth mirror and hand mirror. The dental hygienists scored the number of teeth with plaque remaining and the student followed by brushing those areas. Throughout, the hygienists gave a clear idea of what was to be accomplished by correcting any movements judged to be inadequate or incorrect. Training

‡Examiners standardized by going through a training period to allow for similar judgment when looking for a gum condition.

sessions to standardize the hygienists in scoring plaque on the teeth took place prior to the program. Hygienists worked in pairs—during a given week, one hygienist was assigned to supervise the "Scrub" Method while the other supervised the "Bass" Method; their positions were reversed the following weeks.

Students in the study groups were told that they should use the demonstrated methods of brushing and flossing at home, although strong emphasis was not placed on home care during the duration of the study. Students in the Comparison group were told that toothbrushing is important, but no specific method of toothbrushing was presented to them nor were they directed to either brush or not brush. Flossing technique was not demonstrated for them.

At the conclusion of the study, a post-examination was performed on each subject to determine whether any change had occurred in either the gingival condition or the amount of plaque, or both.

Student's t-test was used to test for significant differences between means. The means of the PHP and GI scores were calculated for each group at both the pre- and post-examinations to check for sexual dimorphism or age difference. Both pre- and post-examination mean scores were subjected to a statistical analysis of variance to determine whether inter-group comparison was possible.

Results

Details of the results obtained for the four method groups utilizing different methods of toothbrushing and for the Comparison group are given in the tables. Table 1 gives the pre- and post-mean Gingival Index scores for the four experimental groups and the Comparison group. Table 2 gives the pre- and post-Patient Hygiene Performance scores for the four experimental groups and the Comparison group. The oral hygiene status of the children in both the study and Comparison groups improved significantly over the month-long duration of the study.

Analysis of variance revealed that there was no significant difference (5 per cent level) within the pre- or post-GI or PHP levels of the subjects in the five groups. No differences existed in the pre- and post-mean value by sex or by grade (student's t-test).

Discussion

The primary objectives of this study were to determine: whether the Scrub Method or the Bass Method of toothbrushing is superior in terms of efficiency in removal of plaque when these methods are used by children in the fifth or sixth grades; whether these methods can be taught conveniently and effectively in the classroom setting; whether the use of either method results in better gingival health; and whether the use of dental floss in addition to the use of either toothbrushing method results in greater removal of plaque and better gingival health than either of the toothbrushing methods alone. It was assumed that peer communication and

TABLE 1—Mean Gingival Index Scores Before and After Supervised Toothbrushing for the Five Groups Studied

Group	N	Mean Initial GI Score	S.D.	Mean Final GI Score	S.D.	Mean Difference	S.D.	Level of Significance
Scrub	63	.42394	.36	.11111	.20	.31283	.30	P < .01
Scrub-Floss	56	.36086	.39	.09821	.17	.26265	.37	P < .01
Bass	67	.40609	.37	.11505	.21	.29104	.31	P < .01
Bass-Floss	60	.40903	.40	.1181	.19	.29722	.35	P < .01
Comparison	65	.37372	.36	.16859	.25	.20513	.30	P < .01

TABLE 2—Mean Patient Hygiene Performance Scores Before and After Supervised Toothbrushing for the Five Groups Studied

Group	N	Mean Initial PHP Score	S.D.	Mean Final PHP Score	S.D.	Mean Difference	S.D.	Level of Significance
Scrub	63	2.0794	.89	.55820	.66	1.5212	1.02	P < .01
Scrub-Floss	56	2.0372	.85	.50446	.77	1.5327	.95	P < .01
Bass	67	1.9900	.96	.56592	.70	1.4241	.99	P < .01
Bass-Floss	60	1.8484	1.01	.65278	.78	1.1958	.97	P < .01
Comparison	65	1.9321	1.03	.92949	.95	1.0026	1.05	P < .01

prolonged direct supervision effected by the dental hygienists on the staff would result in improved brushing (and flossing) on the part of the participants.

Although there exists a variance in the speed of carrying out toothbrushing (and flossing) procedures among any given group of children, it seemed advisable to allow only a limited amount of time in order to minimize disruption of school activities. Each day during the first week of the study and on the scoring days of the second week, 20 minutes was allowed for the procedures; on the nonscoring days 15 minutes was allowed. Beginning with the third week and throughout the rest of the month, 15 and 10 minutes respectively were allowed for the procedures. The children's efficiency for the most part did increase commensurate with the established time schedule. Generally, the children had to be supervised very closely to achieve any proficiency in the proper use of dental floss. A study by Radentz, et al.,⁸ which indicates that instruction in flossing must be repetitive in order to be effective, supports this observation.

Our observations indicate that both methods of toothbrushing can be effectively performed by fifth and sixth graders and can be effectively taught within the classroom setting. The implementation of a toothbrushing regime within the classroom setting, with group participation, takes advantage of the children's inclination to increase enthusiasm within a peer-collective situation. However, isolating students from their peers so that they retain only that instruction which they received in their specified group posed a problem in this and comparable studies. Most likely, knowledge about a particular method did not remain isolated. An inter-

group exchange of information probably occurred among the students, and this may have favorably affected the behavior of the Comparison group children as well as making it difficult to compare the results of the different methods.

The study has demonstrated that improvement in oral hygiene will follow from a classroom-based program of demonstration-instruction. However, the question of which brushing technique is superior to the other remains open. It may well be that either method with or without flossing is equally effective for fifth and sixth graders and is within the range of their practical skills to accomplish adequate removal of plaque in order to keep gingivitis at a minimum. The duration of the improvement in oral hygiene is a subject for further study.

REFERENCES

1. Kropf, J. L. Clinical evaluation of a magnifying lighted mirror and unwaxed dental floss as oral hygiene adjuncts. Master's Thesis, Ann Arbor, University Michigan, School Dentistry, 1971. 124 p.
2. Theilade, E., Loe, H., and Jensen, S. B. Experimental gingivitis in man. *J. Periodont.*, 36:177, May-June 1965.
3. Hill, C. H., Levi, P. A., and Glickman, I. The effects of waxed and unwaxed dental floss on interdental plaque accumulation and interdental gingival health. *J. Periodont.*, 44:411, July 1973.
4. McCauley, H. B., Davis, L. B., and Frazier, T. M. Effect on oral cleanliness produced by dental health instruction and brushing the teeth in the classroom. *J. Sch. Health*, 25:250, Nov. 1955.
5. Lindhe, J., and Koch, G. The effect of supervised oral hygiene on the gingiva of children. *Periodont. Res.*, 1:260, 1966.
6. Loe, H. The gingival index, the plaque index and the retention index systems. *J. Periodont.*, 38:38, Nov.-Dec. 1967.
7. Podshadley, A. G., and Haley, J. U. A method for evaluating or-

al hygiene performance. *Pub. Health Rep.*, 83:259, March 1968.

8. Radentz, W. H., Barnes, G. P., Carter, H. G., Ailor, J. E., and Johnson, R. M. An evaluation of two techniques of teaching proper dental flossing procedures. *J. Periodont.*, 44:177, March 1973.

ACKNOWLEDGMENTS

This research was supported by Contract No. N01 DH 34039, National Institutes of Health, U.S. Department of Health, Education, and Welfare.

Harvard Executive Program in Health Policy, Planning, and Regulation Scheduled for Late February

Harvard University announces that its Executive Programs in Health Policy and Management is offering the "Executive Program in Health Policy, Planning and Regulation," to be held at the Harvard School of Public Health in Boston from February 27 through March 25, 1977. The Program has been designed primarily for health professionals who hold senior positions in such agencies as Health Systems Agencies, State Health Departments, Medicaid Programs, Professional Standards Review Organizations, and Rate Setting Bodies. Senior individuals from appropriate federal agencies, state legislative committees, private companies, and health care institutions are also encouraged to apply.

The Program is designed to develop both analytical skills and substantive knowledge of the health care system through an intensive and carefully designed sequence of sessions that will employ a variety of instructional formats, including both lectures and case discussions. Emphasis will be placed on the political economy of the health system, on the use of statistical data, decision theory, and cost-benefit analysis, and on the use of organizational analysis. Among the substantive and administrative problems covered during the program are quality of care regulation, certificate of need procedures, mechanisms for controlling hospital cost/prices, manpower planning, enforcement and inspection techniques, legal constraints and initiatives, and the impact of community/political pressures on the regulatory process.

As a matter of policy, Harvard University does not discriminate in the admission or treatment of participants on the basis of race or sex. Executive Programs strongly encourages applications from minorities and women. For further information contact:

Administrative Director for Policy Programs
Executive Programs in Health Policy and Management
Harvard School of Public Health
677 Huntington Avenue
Boston, MA 02115
(617) 734-3300, ext. 2601