Toothbrushing Pressures And Oral Hygiene Scores In A Special Education Group

Larry W. White, DDS

An evaluation of the toothbrushing pressures and oral hygiene scores of a group of mentally impaired students has been done with a specially developed strain gauge toothbrush. These students averaged .18 lbs. (2.8 oz.) when they brushed with a specially designed strain gauge toothbrush. The mean plaque scores showed that 70% of the tooth surfaces evaluated had plaque.

A recent study (White 1983) demonstrated that two groups of orthodontic patients had greatly different toothbrushing pressures. Those patients with habitually poor oral hygiene used, on the average, 4½ times less toothbrush force than those patients who habitually had good oral hygiene.

This study was undertaken to see what toothbrush pressures and oral hygiene scores a non-orthodontic population with mental retardation might have.

Review of the literature:

All dental health professionals are aware of the importance of good oral hygiene. A great deal of every dental health curriculum is devoted to the idea of good oral hygiene being responsible for oral health. And this concept is rightly emphasized since there is such strong and unassailable evidence that a plaque free mouth results in less dental disease (Arnim 1963).

There has been very little professional interest in toothbrushing pressures per se. Before the studies published by White (1933, 1984), no one had segregated individuals into good and poor oral hygiene groups to see if their toothbrushing pressures might be significantly different (Allen and Nahodil 1972, Breitenmoser **et al.**, 1976, Fraleigh **et al.**).

Methods and materials:

Thirteen students in a public school class for the mentally impaired were selected for this study. There were 8 males ranging in age from 7 years to 17 years, and there were 5 females ranging in age from 8 years to 16 years. None of these students had previously received any professional oral hygiene instruction.

At the beginning of the study, the patients' teeth were stained for plaque with a dark purple disclosing solution after they had completed their ordinary oral hygiene care. A dark plaque stain was selected so that intraoral colored photographs could be taken and evaluated objectively according to a reliable technique first suggested by Pilot (1968). For reasons of objectivity, the photographs were evaluated by a periodontist in the periodontal department at Baylor Dental College using an abbreviated Hygiene Analysis Index (Love). The Hygiene Analysis Index (HAI) considers an evaluated surface as either clean or dirty after using a disclosing solution. If there is any stained plaque attached to the surface being examined, it is given a rating of 1; if not, it is given a rating of 0. A percentage score is given to each patient by dividing the number of examined surfaces. Only the six anterior maxillary and mandibular teeth were used in this evaluation. The intraoral photographs and Hygiene Analysis Indices displayed (Fig. 1) are representative of the appearance of these stained mouths.

After the original photographs were made, each student was given a multitufted, soft, rounded bristle toothbrush (Dental H BiPo Orthodontic Toothbrush).

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DHI Score - 97%
32 of 33 surfaces
covered with plaque

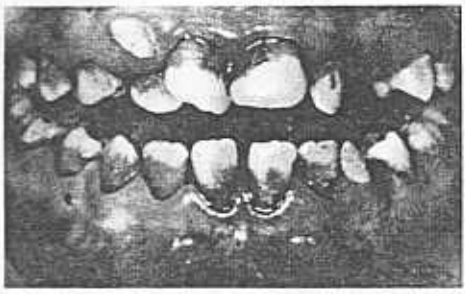

FIGURE 1

This personal toothbrush was attached to a special strain gauge that was developed to measure and average the amount of force, in pounds, that the student used over a 30 second period of uninterrupted toothbrushing (Fig. 2). The students were asked to brush with this apparatus for 30 seconds in a routine

FIGURE 2

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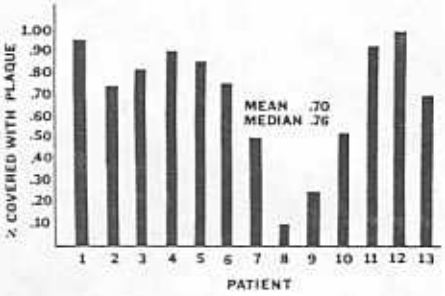
manner without stopping. No effort was made to give the patients any instruction prior to the test. The 30 second period of time was used because previous experiments with this apparatus showed that 30 seconds was the optimal time for permitting an uninterrupted testing session (White 1983).



GRAPH 1

Results:

The average pressure with which each student brushed is shown in Table I.

The HAI scores of the students are recorded in Graph No. 1. Only 2 students had HAI scores under 50%, and the average score showed 70% of the evaluated tooth surfaces to be plaque infested.

Discussion:

There have been several references in dental literature specifically warning patients not to use too much force when brushing because of the danger of dental and gingival erosion (Sanques 1976, Hine 1954, Baes 1948, Fraleigh **et al.**). And there is ample evidence that dental and gingival damage can occur (Miler 1907, Arnim and Blackburn 1961, Slop and Arends 1983). But in a previous study it was discovered that good orthodontic toothbrushers habitually used almost a pound of pressure with no dental or gingival deterioration (White 1983). This small group of mentally retarded students had, on the average, 70% of their evaluated tooth surfaces infested with plaque. Their toothbrushing pressures averaged .18 lbs. (2.8 oz.). These pressures are quite similar to those of orthodontic patients with habitually poor oral hygiene.

In future extensions of this study, it would be interesting to see if other groups have any correlation between their plaque scores and toothbrushing pressures. Some groups that need to be studied are adolescents with chronic gingivitis, adult patients with diagnosed periodontal disease, patients with excellent oral hygiene, etc. It would also be interesting to see if groups with poor oral hygiene could improve their oral hygiene scores by using more toothbrushing pressure with a pressure monitoring toothbrush.

POUNDS OF TOOTHBRUSHING FORCE ORIGINALLY USED

PATIENT	POUNDS
1	.15
2	.01
3	.20
4	.13
5	.07
6	.20
7	.45
8	.31
9	.20
10	.27
11	.13
12	.10
13	.20

MEAN = .18 LBS.

TABLE 1

Summary:

Thirteen mentally impaired students ranging in age from 7 years to 17 years

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and who had not been previously instructed in oral hygiene were tested with a special strain gauge for the amount of toothbrushing pressure they habitually used. All of these students recorded less than .5 lbs. (8 oz.) and averaged .18 lbs. (2.8 oz.). The oral hygiene of each patient was scored with the Hygiene Analysis Index (HAI), and the average score indicated 70% of the evaluated tooth surfaces were covered with plaque.

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Larry W. White, D.D.S.
111 W. Clinton
Hobbs, New Mexico 88240