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Relationship Between the Calculus Present on Teeth and Stainable Dental Plaque

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PREVIOUS studies¹⁻⁸ have indicated that a relationship exists between dental plaque and calculus formation. Since this would seem to infer that there is a direct quantitative relationship between these two entities, and because it is of interest in clinical oral hygiene and clinical calculus studies to know which particular phase to record, it was decided to further investigate this relationship.

PROCEDURE

Three clinical calculus studies provided the opportunity to make observations concerning the relationship that exists between dental calculus formation on the lingual surfaces of the six lower anterior teeth and the total stainable dental plaque on these same teeth. The three studies consisted of groups of 53, 63 and 110 calculus forming subjects, respectively. Each study was conducted in the following manner: all of the subjects in the studies received a preliminary oral prophylaxis. The thoroughness of the cleansing procedure was checked thru utilization of a basic fuchsin disclosing solution. Dentifrice and toothbrushes were then distributed to all the subjects and re-supplied as necessary. No specific tooth-brushing instructions were given to the subjects, but they were requested to brush their teeth at least twice a day in their normal, routine manner. In addition, they refrained from any dental procedures during the three month test period. Since all three studies utilized institutionalized subjects, the diet remained constant.

After three months the subjects were recalled and evaluated for the amount of calculus formation and also the total stainable dental plaque. The subjects had routinely brushed their teeth on the morning of the examination and were examined prior to eating any meals. The examinations were conducted independently by three different, trained examiners. The amount of calculus was ascertained by the V-M probe method.⁹ This technique measures calculus present on the lingual surface of the lower six anterior teeth. The instrument used is a standard periodontal probe, graduated in millimeters and tape-colored at the graduated end to facilitate accurate readings. After drying the teeth with a stream of air, the instrument is inserted to the most inferior border of visible calculus and measurements obtained in three separate planes. In all of the examinations, this procedure preceded the determination of plaque because staining the teeth interfered with this method of calculus assessment.

The amount of stainable dental plaque present on these same lingual surfaces was determined through use of a basic fuchsin disclosing solution which was applied to the teeth. Following this application, the subjects rinsed their mouths twice with water to remove any excess stain. The examiners subjectively evaluated the stained areas in reference to the total tooth surfaces involved, utilizing a scoring range from zero (no stained material) to three (complete coverage of lingual surface by stained material).¹⁰

RESULTS

The data from the three clinical studies are represented in Tables 1, 2 and 3.

The first study (Table 1) indicates that none of the three examiners showed a sig-

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TABLE 1
Clinical Study No. 1

Examiner	Number of Subjects	Total Calculus*	Total Dental Plaque**	Correlation Coefficient	Significance
A	53	159.2	178.0	0.035	N.S.
B	53	155.3	206.9	0.039	N.S.
C	53	137.7	203.3	-0.158	N.S.

*This value was obtained as follows: The total calculus present on the six lower anterior teeth of a subject, as determined by the V-M method, was divided by six to obtain a mean calculus score for that particular subject. The total of the 53 mean calculus scores is the value utilized in the correlation analysis and represented in the tables as Total Calculus.

**This value, Total Dental Plaque, is obtained in a manner similar to that described for Total Calculus, except that the stain scores were utilized, rather than the calculus scores.

TABLE 2
Clinical Study No. 2

Examiner	Number of Subjects	Total Calculus	Total Dental Plaque	Correlation Coefficient	Significance
A	63	153.3	283.7	0.183	N.S.
B	63	221.0	275.6	0.352	.01
C	63	172.4	243.1	0.216	N.S.

TABLE 3
Clinical Study No. 3

Examiner	Number of Subjects	Total Calculus	Total Dental Plaque	Correlation Coefficient	Significance
A	110	214.5	231.8	0.404	.001
B	110	218.3	250.5	0.240	.03
C	110	197.0	196.7	0.388	.001

nificant correlation between total calculus and total dental plaque. In fact, examiner C showed a slight negative relationship while A and B, although still negligible, showed in the positive range. In the second study (Table 2), one of the examiners (examiner B) showed a statistically significant correlation between calculus and plaque formation. However, neither examiner A nor C demonstrated a like correlation. Table 3 indicates that in the third study all three examiners showed statistically significant correlations between calculus and dental plaque formation.

DISCUSSION

The demonstration in some cases of a significant correlation between calculus and dental plaque and the inability to find such a significant consanguinity in others is most interesting. It is especially so when considering the long held belief that the two are intimately related. The significant correlations observed in the third study indicate that there may be such a definitive relationship. However, it also points out

rather graphically the oft-found clinical experience of detecting dental plaque in the mouths of people who exhibit no dental calculus. It would seem, therefore, that additional investigation into the relationship between calculus and dental plaque is indicated before conclusions could be reached.

CONCLUSIONS

1. The three clinical studies described in this report have failed to conclusively establish a direct quantitative relationship between calculus and dental plaque. Thus, a need would appear to exist for additional investigation to properly assess this relationship.

2. Until this relationship is more fully understood, calculus and dental plaque each should be assessed and evaluated as a separate entity.

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